



Internal Use Only

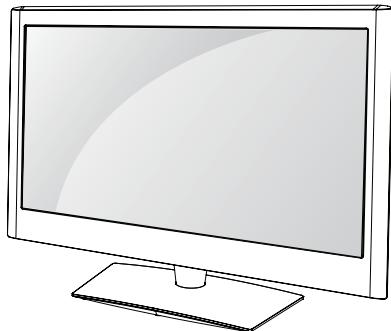
<http://biz.lgservice.com>

# LED LCD TV SERVICE MANUAL

CHASSIS : LC01S

MODEL : 22LV2500    22LV2500-CC

**CAUTION**  
BEFORE SERVICING THE CHASSIS,  
READ THE SAFETY PRECAUTIONS IN THIS MANUAL.



P/NO : MFL67002104 (1104-REV00)

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# SAFETY PRECAUTIONS

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by  $\Delta$  in the Schematic Diagram and Exploded View.

It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent Shock, Fire, or other Hazards.

Do not modify the original design without permission of manufacturer.

### General Guidance

An **isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from the AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks.

It will also protect the receiver and its components from being damaged by accidental shorts of the circuitry that may be inadvertently introduced during the service operation.

If any fuse (or Fusible Resistor) in this TV receiver is blown, replace it with the specified.

When replacing a high wattage resistor (Oxide Metal Film Resistor, over 1 W), keep the resistor 10 mm away from PCB.

Keep wires away from high voltage or high temperature parts.

### Before returning the receiver to the customer,

always perform an **AC leakage current check** on the exposed metallic parts of the cabinet, such as antennas, terminals, etc., to be sure the set is safe to operate without damage of electrical shock.

### Leakage Current Cold Check(Antenna Cold Check)

With the instrument AC plug removed from AC source, connect an electrical jumper across the two AC plug prongs. Place the AC switch in the on position, connect one lead of ohm-meter to the AC plug prongs tied together and touch other ohm-meter lead in turn to each exposed metallic parts such as antenna terminals, phone jacks, etc.

If the exposed metallic part has a return path to the chassis, the measured resistance should be between  $1\text{ M}\Omega$  and  $5.2\text{ M}\Omega$ .

When the exposed metal has no return path to the chassis the reading must be infinite.

An other abnormality exists that must be corrected before the receiver is returned to the customer.

### Leakage Current Hot Check (See below Figure)

Plug the AC cord directly into the AC outlet.

#### Do not use a line Isolation Transformer during this check.

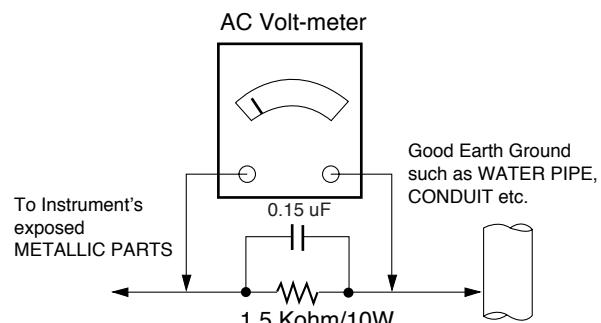
Connect 1.5 K / 10 watt resistor in parallel with a 0.15 uF capacitor between a known good earth ground (Water Pipe, Conduit, etc.) and the exposed metallic parts.

Measure the AC voltage across the resistor using AC voltmeter with 1000 ohms/volt or more sensitivity.

Reverse plug the AC cord into the AC outlet and repeat AC voltage measurements for each exposed metallic part. Any voltage measured must not exceed 0.75 volt RMS which corresponds to 0.5 mA.

In case any measurement is out of the limits specified, there is possibility of shock hazard and the set must be checked and repaired before it is returned to the customer.

### Leakage Current Hot Check circuit



When 25A is impressed between Earth and 2nd Ground for 1 second, Resistance must be less than  $0.1\text{ }\Omega$

\*Base on Adjustment standard

# SERVICING PRECAUTIONS

**CAUTION:** Before servicing receivers covered by this service manual and its supplements and addenda, read and follow the *SAFETY PRECAUTIONS* on page 3 of this publication.

**NOTE:** If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 3 of this publication, always follow the safety precautions.

Remember: Safety First.

## General Servicing Precautions

1. Always unplug the receiver AC power cord from the AC power source before;
  - a. Removing or reinstalling any component, circuit board module or any other receiver assembly.
  - b. Disconnecting or reconnecting any receiver electrical plug or other electrical connection.
  - c. Connecting a test substitute in parallel with an electrolytic capacitor in the receiver.
- CAUTION:** A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc) equipped with a suitable high voltage probe.  
Do not test high voltage by "drawing an arc".
3. Do not spray chemicals on or near this receiver or any of its assemblies.
4. Unless specified otherwise in this service manual, clean electrical contacts only by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable non-abrasive applicator; 10 % (by volume) Acetone and 90 % (by volume) isopropyl alcohol (90 % - 99 % strength)  
**CAUTION:** This is a flammable mixture.  
Unless specified otherwise in this service manual, lubrication of contacts is not required.
5. Do not defeat any plug/socket B+ voltage interlocks with which receivers covered by this service manual might be equipped.
6. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
7. Always connect the test receiver ground lead to the receiver chassis ground before connecting the test receiver positive lead.  
Always remove the test receiver ground lead last.
8. *Use with this receiver only the test fixtures specified in this service manual.*

## Electrostatically Sensitive (ES) Devices

Some semiconductor (solid-state) devices can be damaged easily by static electricity. Such components commonly are called *Electrostatically Sensitive (ES) Devices*. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed to prevent potential shock reasons prior to applying power to the unit under test.

2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material).
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

**CAUTION:** Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

## General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range of 500 °F to 600 °F.
2. Use an appropriate gauge of RMA resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a small wire-bristle (0.5 inch, or 1.25 cm) brush with a metal handle.  
Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique
  - a. Allow the soldering iron tip to reach normal temperature. (500 °F to 600 °F)
  - b. Heat the component lead until the solder melts.
  - c. Quickly draw the melted solder with an anti-static, suction-type solder removal device or with solder braid.  
**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
  - a. Allow the soldering iron tip to reach a normal temperature (500 °F to 600 °F)
  - b. First, hold the soldering iron tip and solder the strand against the component lead until the solder melts.
  - c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.  
**CAUTION:** Work quickly to avoid overheating the circuit board printed foil.
  - d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.

## **IC Remove/Replacement**

Some chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

### *Removal*

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

### *Replacement*

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush.  
(It is not necessary to reapply acrylic coating to the areas).

## **"Small-Signal" Discrete Transistor Removal/Replacement**

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact then solder each connection.

## **Power Output, Transistor Device Removal/Replacement**

1. Heat and remove all solder from around the transistor leads.
2. Remove the heat sink mounting screw (if so equipped).
3. Carefully remove the transistor from the heat sink of the circuit board.
4. Insert new transistor in the circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heat sink.

## **Diode Removal/Replacement**

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicular y to the circuit board.
3. Observing diode polarity, wrap each lead of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and if necessary, apply additional solder.

## **Fuse and Conventional Resistor**

### **Removal/Replacement**

1. Clip each fuse or resistor lead at top of the circuit board hollow stake.
2. Securely crimp the leads of replacement component around notch at stake top.
3. Solder the connections.

**CAUTION:** Maintain original spacing between the replaced component and adjacent components and the circuit board to prevent excessive component temperatures.

## **Circuit Board Foil Repair**

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board causing the foil to separate from or "lift-off" the board. The following guidelines and procedures should be followed whenever this condition is encountered.

### *At IC Connections*

To repair a defective copper pattern at IC connections use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections).

1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary).
2. carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.
3. Bend a small "U" in one end of a small gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the out-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area and clip off any excess jumper wire.

### *At Other Connections*

Use the following technique to repair the defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side.  
Carefully crimp and solder the connections.

**CAUTION:** Be sure the insulated jumper wire is dressed so the it does not touch components or sharp edges.

# SPECIFICATION

NOTE : Specifications and others are subject to change without notice for improvement.

## 1. Application range

This specification is applied to the LCD TV used LC01S chassis.

## 2. Requirement for Test

Each part is tested as below without special appointment.

- 1) Temperature :  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ), CST :  $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$
- 2) Relative Humidity :  $65\% \pm 10\%$
- 3) Power Voltage : Standard input voltage (AC 100-240 V~ 50 / 60 Hz)  
\* Standard Voltage of each products is marked by models.
- 4) Specification and performance of each parts are followed each drawing and specification by part number in accordance with BOM.
- 5) The receiver must be operated for about 5 minutes prior to the adjustment.

## 3. Test method

- 1) Performance: LGE TV test method followed
- 2) Demanded other specification
  - Safety: CE, IEC specification
  - EMC:CE, IEC

## 4. Model General Specification

No	Item	Specification	Measure men t	Result	Remark
1	Display Screen Device	22wide Color Display Module			Edge LED
2	Aspect Ratio	16:9			
3	LCD Module	22" TFT LED FHD			CMI : 22LV2500-CC
4	Storage Environment	Temp. : -20 ~ 60 deg, Humidity : 10 ~ 90 %			
5	Input Voltage	100-240V~ 50/60Hz			
6	Power on (Blue)				LCD(Module) + Backlight(LED)
	Power Consumption	22" LGD(FHD) 26w			
	Module size	22" LGD(FHD) 495.6(H) x 292.2(V) x 14.5 (D) (Typ.)			
	Pixel Pitch	22" LGD(FHD) 0.2475 mm x 0.2475 mm			
	Back Light	22" LGD(FHD) EdgeL			
	Display Colors	1.06 Billion, 16.7 Milion			
	Coating	3H, AG			

## 5. Component Video Input (Y, Pb, Pr)

No.	Specification				Remark
	Resolution	H-freq(kHz)	V-freq(Hz)		
1.	720x480	15.73	60.00	SDTV,DVD 480i	
2.	720x480	15.63	59.94	SDTV,DVD 480i	
3.	720x480	31.47	59.94	480p	
4.	720x480	31.50	60.00	480p	
5.	720x576	15.625	50.00	SDTV,DVD 625 Line	
6.	720x576	31.25	50.00	HDTV 576p	
7.	1280x720	45.00	50.00	HDTV 720p	
8.	1280x720	44.96	59.94	HDTV 720p	
9.	1280x720	45.00	60.00	HDTV 720p	
10.	1920x1080	31.25	50.00	HDTV 1080i	
11.	1920x1080	33.75	60.00	HDTV 1080i	
12.	1920x1080	33.72	59.94	HDTV 1080i	
13.	1920x1080	56.250	50	HDTV 1080p	
14.	1920x1080	67.5	60	HDTV 1080p	

## 6. RGB Input (PC)

No	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock (MHz)	Proposed	Remarks
1.	720*400	31.468	70.08	28.321		For only DOS mode
2.	640*480	31.469	59.94	25.17	VESA	Input 848*480 60Hz, 852*480 60Hz → 640*480 60Hz Display
3.	800*600	37.879	60.31	40.00	VESA	
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	
5.	1280*768	47.78	59.87	79.5	WXGA	
6.	1360*768	47.72	59.8	84.75	WXGA	FHD model
7.	1366*768	47.56	59.6	84.75	WXGA	WXGA model
8.	1280*1024	63.595	60.0	108.875	SXGA	FHD model
9.	1280*720	45	60	74.25	720P	DTV standard
10.	1920*1080	66.587	59.93	138.5	WUXGA	FHD model

## 7. HDMI Input

### (1) DTV Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*480	31.469 /31.5	59.94 /60	27.00/27.03	SDTV 480P	
2.	720*576	31.25	50	54	SDTV 576P	
3.	1280*720	37.500	50	74.25	HDTV 720P	
4.	1280*720	44.96 /45	59.94 /60	74.17/74.25	HDTV 720P	
5.	1920*1080	33.72 /33.75	59.94 /60	74.17/74.25	HDTV 1080I	
6.	1920*1080	28.125	50.00	74.25	HDTV 1080I	
7.	1920*1080	26.97 /27	23.97 /24	74.17/74.25	HDTV 1080P	
8.	1920*1080	33.716 /33.75	29.976 /30.00	74.25	HDTV 1080P	
9.	1920*1080	56.250	50	148.5	HDTV 1080P	
10.	1920*1080	67.43 /67.5	59.94 /60	148.35/148.50	HDTV 1080P	

### (2) PC Mode

No.	Resolution	H-freq(kHz)	V-freq.(Hz)	Pixel clock(MHz)	Proposed	Remark
1.	720*400	31.468	70.08	28.321		HDCP
2.	640*480	31.469	59.94	25.17	VESA	HDCP
3.	800*600	37.879	60.31	40.00	VESA	HDCP
4.	1024*768	48.363	60.00	65.00	VESA(XGA)	HDCP
5.	1360*768	47.72	59.8	84.75	WXGA	HDCP
6.	1280*1024	63.981	60.02	108.875	SXGA	HDCP/FHD model
7.	1920*1080	67.5	60.00	138.625	WUXGA	HDCP/FHD model

# ADJUSTMENT INSTRUCTION

## 1. Application Range

This specification sheet is applied to all of the LCD TV with LC01S chassis.

## 2. Designation

1) The adjustment is according to the order which is designated and which must be followed, according to the plan which can be changed only on agreeing.

2) Power Adjustment: Free Voltage

3) Magnetic Field Condition: Nil.

4) Input signal Unit: Product Specification Standard

5) Reserve after operation: Above 5 Minutes (Heat Run)

Temperature : at 25 °C ± 5 °C

Relative humidity : 65 % ± 10 %

Input voltage : 220 V, 60 Hz

In case of keeping module is in the circumstance of 0°C, it should be placed in the circumstance of above 15°C for 2 hours.

In case of keeping module is in the circumstance of below -20°C, it should be placed in the circumstance of above 15°C for 3 hours.

6) Adjustment equipments: Color Analyzer(CA-210 or CA-110), DDC Adjustment Jig equipment, Service remote control.

7) Push the "IN STOP" key - For memory initialization.

Case1 : Software version up

1. After downloading S/W by USB, TV set will reboot automatically
2. Push "In-stop" key
3. Push "Power on" key
4. Function inspection
5. After function inspection, Push "In-stop" key.

Case2 : Function check at the assembly line

1. When TV set is entering on the assembly line, Push "In-stop" key at first.
2. Push "Power on" key for turning it on.  
-> If you push "Power on" key, TV set will recover channel information by itself.
3. After function inspection, Push "In-stop" key.

## 3. Main PCB check process

\* APC - After Manual-Insert, executing APC

### \* Boot file Download

1) Execute ISP program "Mstar ISP Utility" and then click "Config" tab.

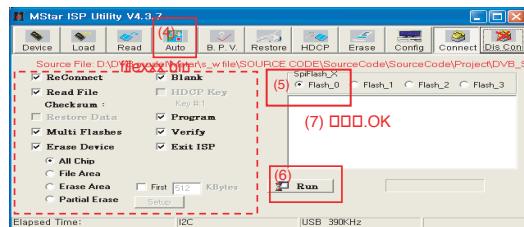


Please Check the Speed :  
To use speed between  
from 200KHz to 400KHz

5) Click "Auto" tab and set as below.

6) Click "Run".

7) After downloading, check "OK" message.



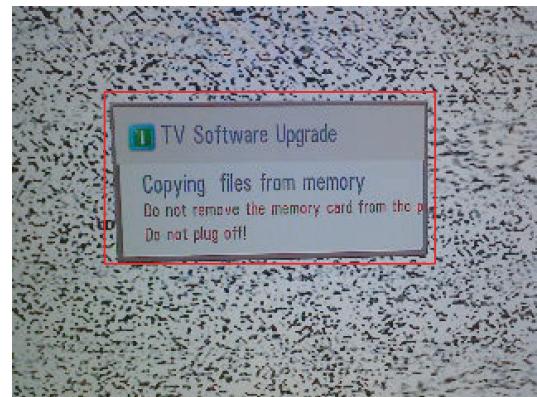
### \* USB DOWNLOAD

1) Put the USB Stick to the USB socket.

2) Automatically detecting update file in USB Stick.

- If your downloaded program version in USB Stick is Low, it didn't work. But your downloaded version is High, USB data is automatically detecting.

3) Show the message "Copying files from memory".



2) Set as below, and then click "Auto Detect" and check "OK" message

If "Error" is displayed, Check connection between computer, jig, and set.

3) Click "Read" tab, and then load download file (XXXX.bin) by clicking "Read"

4) Click "Connect" tab. If "Can't" is displayed, check connection between computer, jig, and set.

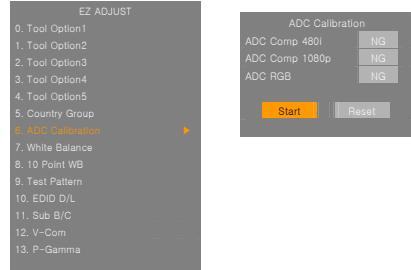
4) Updating is starting.



### 3.1. ADC Process

#### (1) ADC

- Enter Service Mode by pushing "ADJ" key,
- Enter Internal ADC mode by pushing "▶" key at "5. ADC Calibration"



<Caution> Using 'power on' button of the Adjustment remote control, power on TV.

#### \* ADC Calibration Protocol (RS232)

No	Item	CMD1	CMD2	Data0	
Enter Adjust Mode	Adjust 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
ADC adjust	ADC Adjust	A	D	1 0	Automatically adjustment (The use of a internal pattern)

#### Adjust Sequence

- aa 00 00 [Enter Adjust Mode]
- xb 00 40 [Component1 Input (480i)]
- ad 00 10 [Adjust 480i Comp1]
- xb 00 60 [RGB Input (1024\*768)]
- ad 00 10 [Adjust 1024\*768 RGB]
- aa 00 90 End Adjust mode

\* Required equipment : Adjustment remote control.

### 3.2. Function Check

#### \* Check display and sound

- Check Input and Signal items. (cf. work instructions)

1) TV

2) AV (SCART1/SCART2/ CVBS)

3) COMPONENT (480i)

4) RGB (PC : 1024 x 768 @ 60 hz)

5) HDMI

6) PC Audio In

\* Display and Sound check is executed by Remote control.

5) Uploading completed, The TV will restart automatically.

6) If your TV is turned on, check your updated version and Tool option.(explain the Tool option, next stage)  
 \* If downloading version is more high than your TV have, TV can lost all channel data. In this case, you have to channel recover. if all channel data is cleared, you didn't have a DTV/ATV test on production line.

#### \* After downloading, have to adjust Tool Option again.

- 1) Push "IN-START" key in service remote control.
- 2) Select "Tool Option 1" and Push "OK" key.
- 3) Punch in the number. (Each model has their number)

Module	Tool option1	Tool option2	Tool option3(AU,TS)	Tool option4	Tool option5
22LV2500	10020	8714	55337	3100	16640

4) Completed selecting Tool option.

## 4. White Balance Adjustment

### 4.1 Overview

- W/B adj. Objective & How-it-works

- Objective: To reduce each Panel's W/B deviation  
 - How-it-works: When R/G/B gain in the OSD is at 192, it means the panel is at its Full Dynamic Range. In order to prevent saturation of Full Dynamic range and data, one of R/G/B is fixed at 192, and the other two is lowered to find the desired value.  
 -Adj. condition : normal temperature

1) Surrounding Temperature:  $25 \pm 5^{\circ}\text{C}$

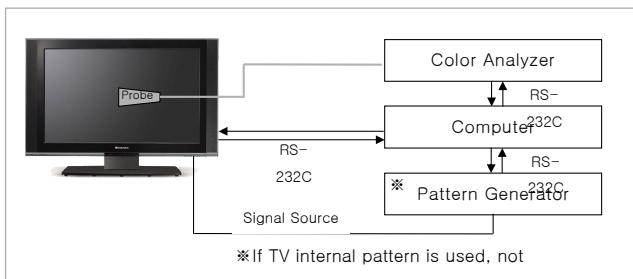
2) Warm-up time: About 5 Min

3) Surrounding Humidity: 20% ~ 80%

### 4. 2 Equipment

- 1) Color Analyzer: CA-210 (LED Module : CH 14)
- 2) Adj. Computer(During auto adj., RS-232C protocol is needed)
- 3) Adjust Remocon 4) Video Signal Generator MSPG-925F 720p/216-Gray(Model:217, Pattern:78)  
 → Only when internal pattern is not available
- Color Analyzer Matrix should be calibrated using CS-1000

### 4.3 Equipment connection MAP



### 4.4 Adj. Command (Protocol)

#### <Command Format>

```
START 6E A 50 A LEN A 03 A CMD
A 00 A VAL A CS A STOP
```

- LEN: Number of Data Byte to be sent

- CMD: Command

- VAL: FOS Data value

- CS: Checksum of sent data

- A: Acknowledge

Ex) [Send: JA\_00\_DD] / [Ack: A\_00\_okDDX]

- RS-232C Command used during auto-adj.

RS-232C COMMAND [CMD ID DATA]			Explanation	
wb	00	00		Begin White Balance adj.
wb	00	10		Gain adj.(internal white pattern)
wb	00	1f		Gain adj. completed
wb	00	20		Offset adj.(internal white pattern)
wb	00	2f		Offset adj. completed
wb	00	ff		End White Balance adj. (internal pattern disappears )

Ex) wb 00 00 → Begin white balance auto-adj.

wb 00 10 → Gain adj.

ja 00 ff → Adj. data

jb 00 c0

...

...

wb 00 1f → Gain adj. complete

\*(wb 00 20(start), wb 00 2f(endc)) → Off-set adj.

wb 00 ff → End white balance auto adj.

#### ▪ Adj. Map

	Adj. item	Command (lower caseASCII)		Data Range (Hex.)		Default (Decimal)	Details
		CMD1	CMD2	MIN	MAX		
Cool	R Gain	j	g	00	C0	TBD	
	G Gain	j	h	00	C0	TBD	
	B Gain	j	i	00	C0	TBD	
	R Cut					TBD	
	G Cut					TBD	
	B Cut					TBD	
Medium	R Gain	j	a	00	C0	TBD	
	G Gain	j	b	00	C0	TBD	
	B Gain	j	c	00	C0	TBD	
	R Cut					TBD	
	G Cut					TBD	
	B Cut					TBD	
Warm	R Gain	j	d	00	C0	TBD	
	G Gain	j	e	00	C0	TBD	
	B Gain	j	f	00	C0	TBD	
	R Cut					TBD	
	G Cut					TBD	

### 4.5 Adj. method

#### 4.5.1 Auto adj. method

- 1) Set TV in adj. mode using POWER ON key
- 2) Zero calibrate probe then place it on the center of the Display.
- 3) Connect Cable(RS-232C).
- 4) Select mode in adj. Program and begin adj.
- 5) When adj. is complete (OK Sing), check adj. status pre mode (Warm, Medium, Cool) 6) Remove probe and RS-232C cable to complete adj.
- W/B Adj. must begin as start command "wb 00 00", and finish as end command "wb 00 ff", and Adj. offset if need .

## 4.5.2 Manual adj. method

- 1) Set TV in Adj. mode using POWER ON
- 2) Zero Calibrate the probe of Color Analyzer, then place it on the center of LCD module within 10cm of the surface.
- 3) Press ADJ key □ EZ adjust using adj. R/C □ 7. White-Balance then press the cursor to the right (KEY). (When K-EY() is pressed 216 Gray internal pattern will be displayed)
- 4) One of R Gain / G Gain / B Gain should be fixed at 192, and the rest will be lowered to meet the desired value.
- 5) Adj. is performed in COOL, MEDIUM, WARM 3 modes of color temperature.
- If internal pattern is not available, use RF input. In EZ Adj. menu 7.White Balance, you can select one of 2 Testpattern: ON, OFF. Default is inner(ON). By selecting OFF, you can adjust using RF signal in 216 Gray pattern.

### - Adj. condition and cautionary items

- 1) Lighting condition in surrounding area  
Surrounding lighting should be lower 10 lux. Try to isolate adj. area into dark surrounding.
- 2) Probe location
  - PDP: Color Analyzer (CA-100, CA-100+, CA210) probe should be firmly attached to the Module
  - LCD: Color Analyzer (CA-210) probe should be within 10cm and perpendicular of the module surface (80°~100°)
- 3) Aging time
  - After Aging Start, Keep the Power ON status during 5 Minutes.
  - In case of LCD, Back-light on should be checked using no signal or Full-white pattern.

## 4.6 Reference (White Balance Adj. coordinate and color temperature)

- Luminance: 216 Gray

### [ Color Temperature ]

#### - LGD Edge LED Models

GP3	Aging time (Min)	Cool(13000K)		Medium(9500K)		Warm(6500K)	
		X( $\pm 0.002$ )	y( $\pm 0.002$ )	x( $\pm 0.002$ )	y( $\pm 0.002$ )	x( $\pm 0.002$ )	y( $\pm 0.002$ )
1	0-2	279	288	295	308	319	338
2	3-5	278	286	294	306	318	336
3	6-9	277	285	293	305	317	335
4	10-19	276	283	292	303	316	333
5	20-35	274	280	290	300	314	330
6	36-49	272	277	288	297	312	327
7	50-79	271	275	287	295	311	325
8	80-149	270	274	286	294	310	324
9	Over 150	269	273	285	293	309	323

#### - O/S Edge LED Models

Mode	Coordinate		Temp	$\Delta uv$
	x	y		
Cool	0.276( $\pm 0.002$ )	0.283( $\pm 0.002$ )	11000K	0.0000
Medium	0.285( $\pm 0.002$ )	0.293( $\pm 0.002$ )	9300K	0.0000
Warm	0.313( $\pm 0.002$ )	0.329( $\pm 0.002$ )	6500K	0.0000

## 4.6.1 DDC EDID Write (RGB 128Byte )

- Connect D-sub Signal Cable to D-Sub Jack.
- Write EDID DATA to EEPROM (24C02) by using **DDC2B** protocol.
- Check whether written EDID data is correct or not.

\* For SVC main Ass'y, EDID have to be downloaded to Insert Process in advance.

## 4.6.2 DDC EDID Write (HDMI 256Byte)

- Connect HDMI Signal Cable to HDMI Jack.
- Write EDID DATA to EEPROM(24C02) by using **DDC2B** protocol.
- Check whether written EDID data is correct or not.

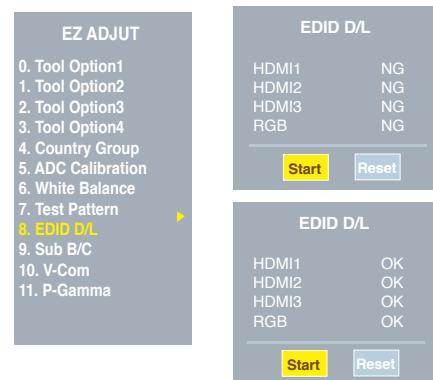
\* For SVC main Ass'y, EDID have to be downloaded to Insert Process in advance.

## 4.6. 3EDID DATA

- 1) All Data : HEXA Value
- 2) Changeable Data :
  - \*: Serial No : Controlled / Data:01
  - \*\*: Month : Controlled / Data:00

## 4.6.4 Auto Download

- 1) After enter Service Mode by pushing "ADJ" key.
- 2) Enter EDID D/L menu.
- 3) Enter "START" by pushing "OK" key.



<Caution> Never connect HDMI && D-sub cable when EDID downloaded

\* Edid data and Model option download (RS232)

NO	Item	CMD1	CMD2	Data0	
Enter download Mode	Download 'Mode In'	A	A	0 0	When transfer the 'Mode In', Carry the command.
EDID data and Model option download	Download	A	E	00 10	Automatically Download (The use of a internal pattern)

## - Manual Download

\* Caution

- 1) Use the proper signal cable for EDID Download
  - Analog EDID : Pin3 exists
  - Digital EDID : Pin3 exists
- 2) Never connect HDMI & D-sub Cable at the same time.
- 3) Use the proper cables below for EDID Writing
- 4) Download HDMI1, HDMI2, separately because HDMI1 is different from HDMI2

For Analog EDID	For HDMI EDID	
D-sub to D-sub	DVI-D to HDMI or HDMI to HDMI	
		

## 4.7 Outgoing condition Configuration

■ Push 'IN STOP' key, then in-stop processing will start.

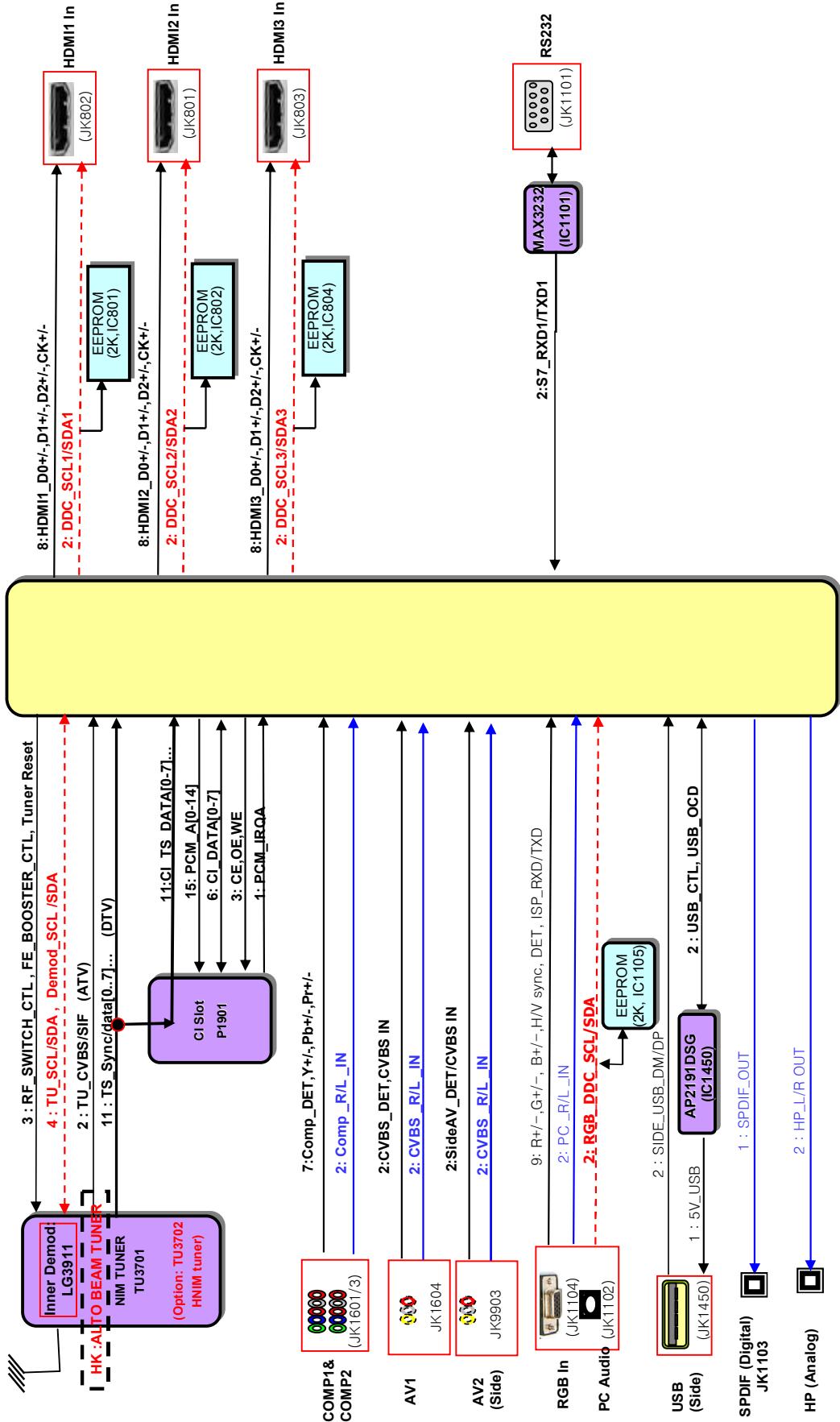
If processing is complete, TV will turn off automatically.

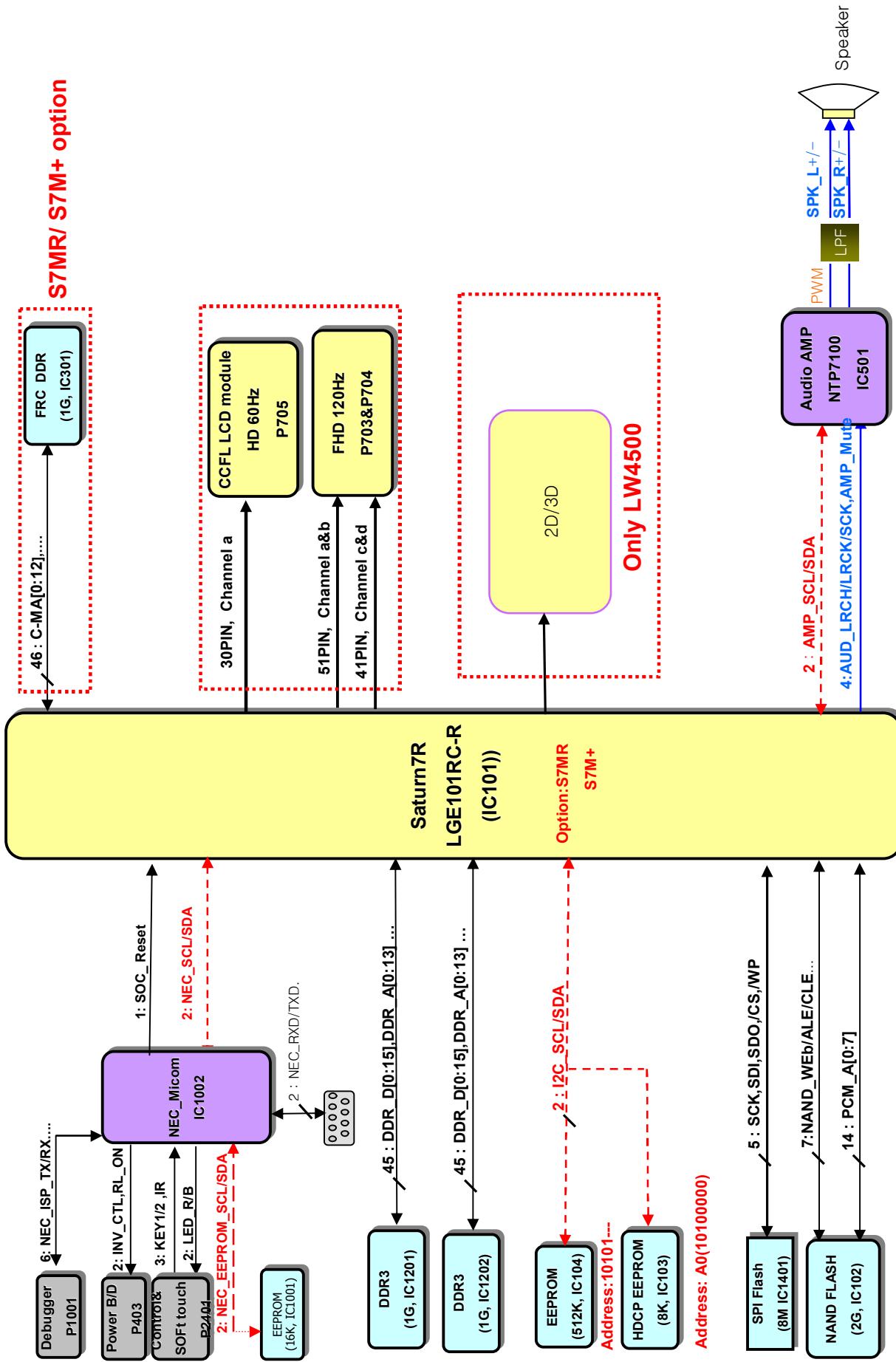
\*Must not AC power OFF during processing.

## 4.8 Internal pressure

Confirm whether is normal or not when between power board's ac block and GND is impacted on 1.5kV(dc) or 2.2kV(dc) for one second.

# BLOCK DIAGRAM

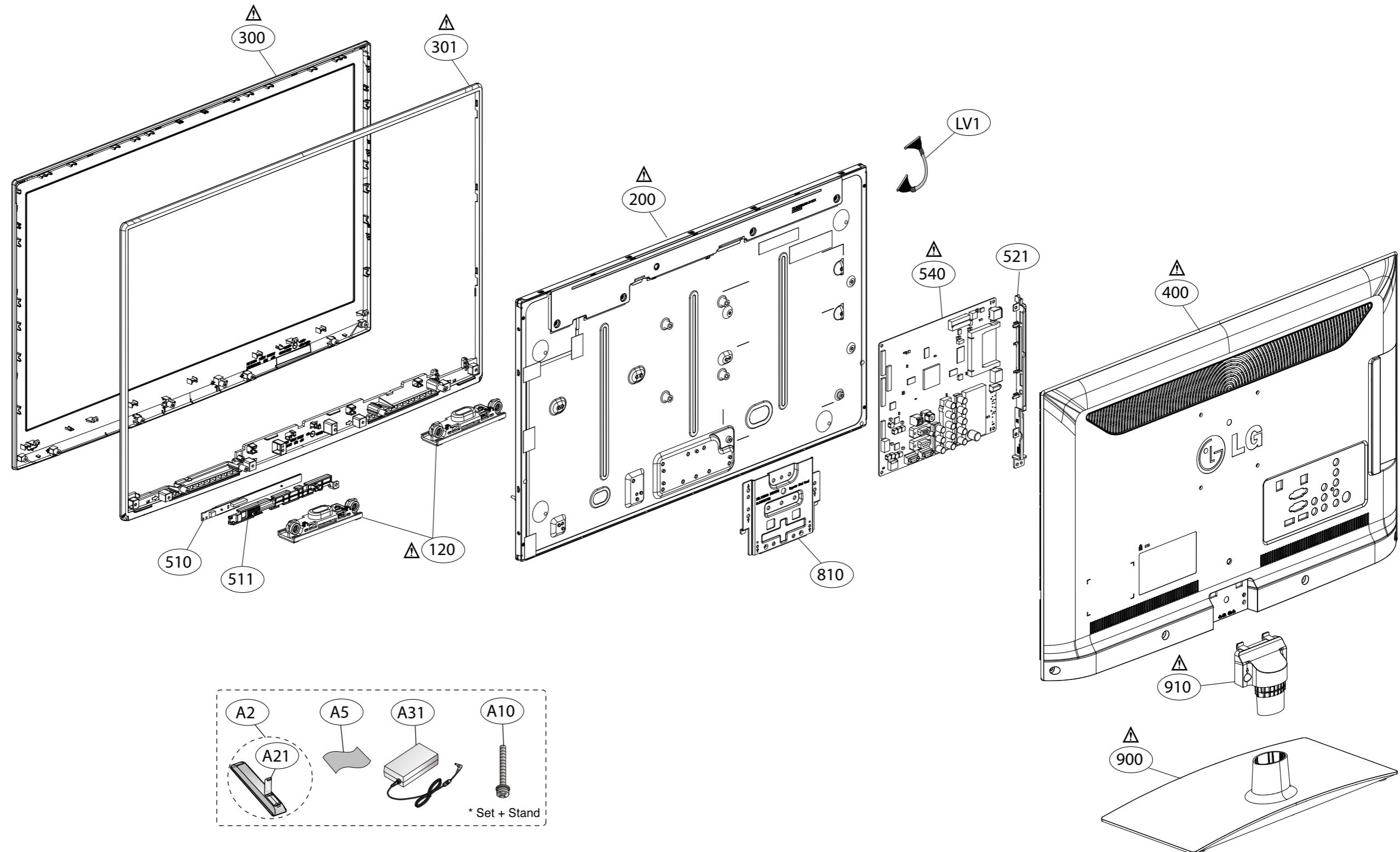


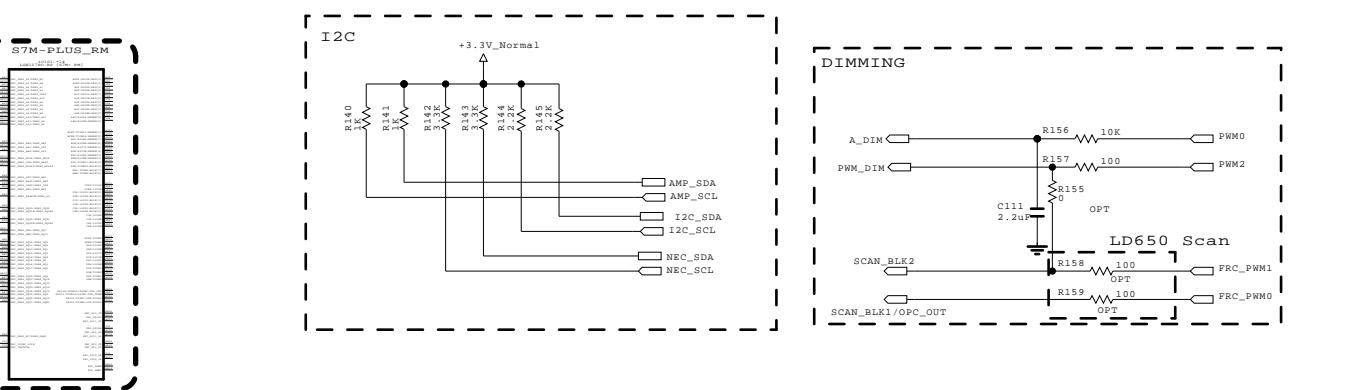
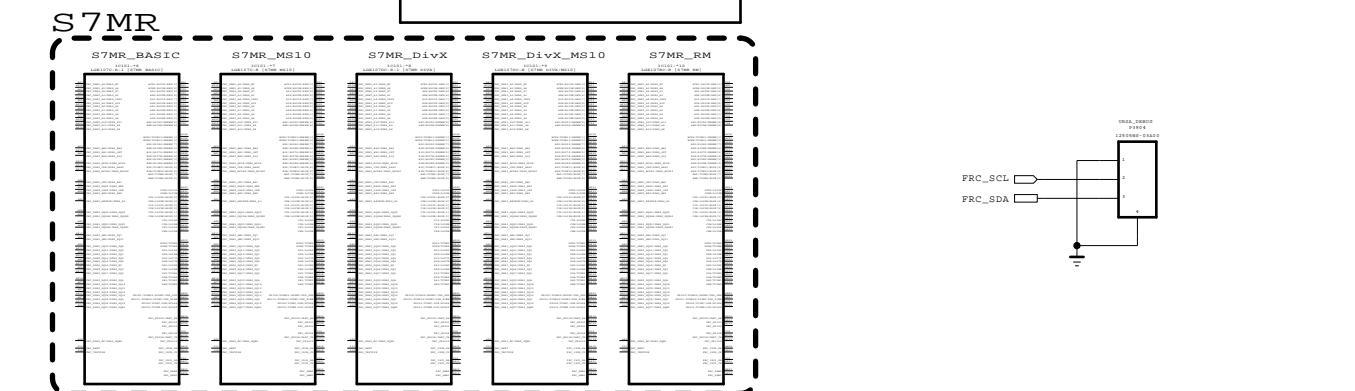
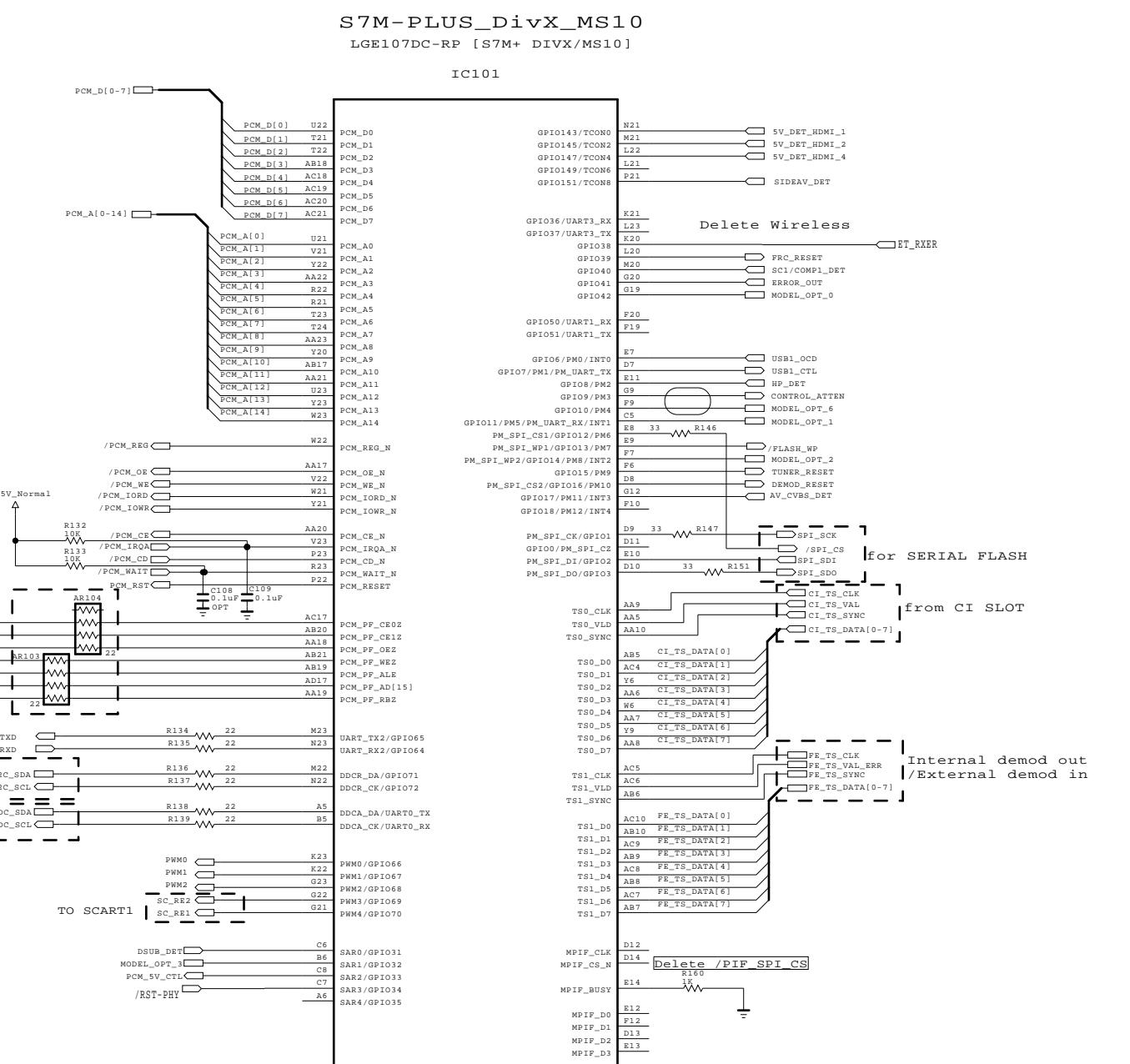
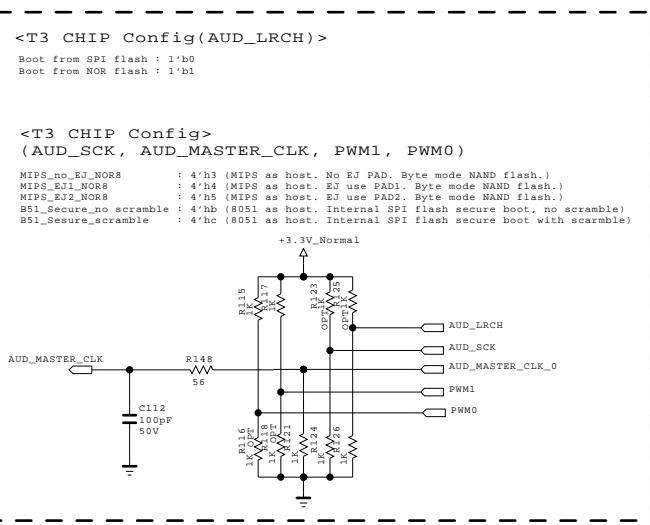
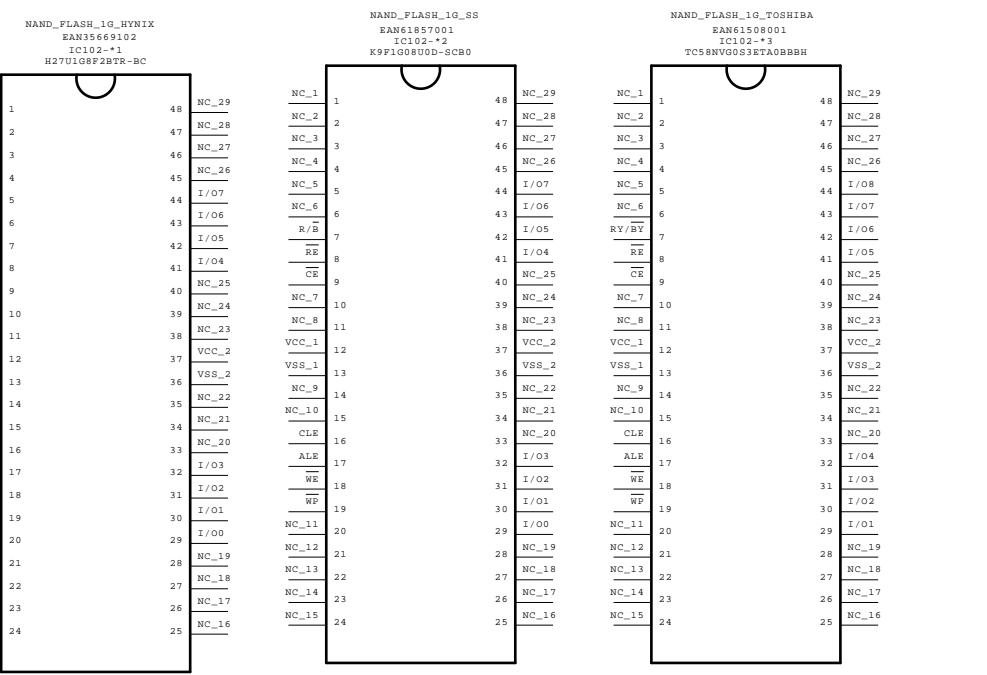
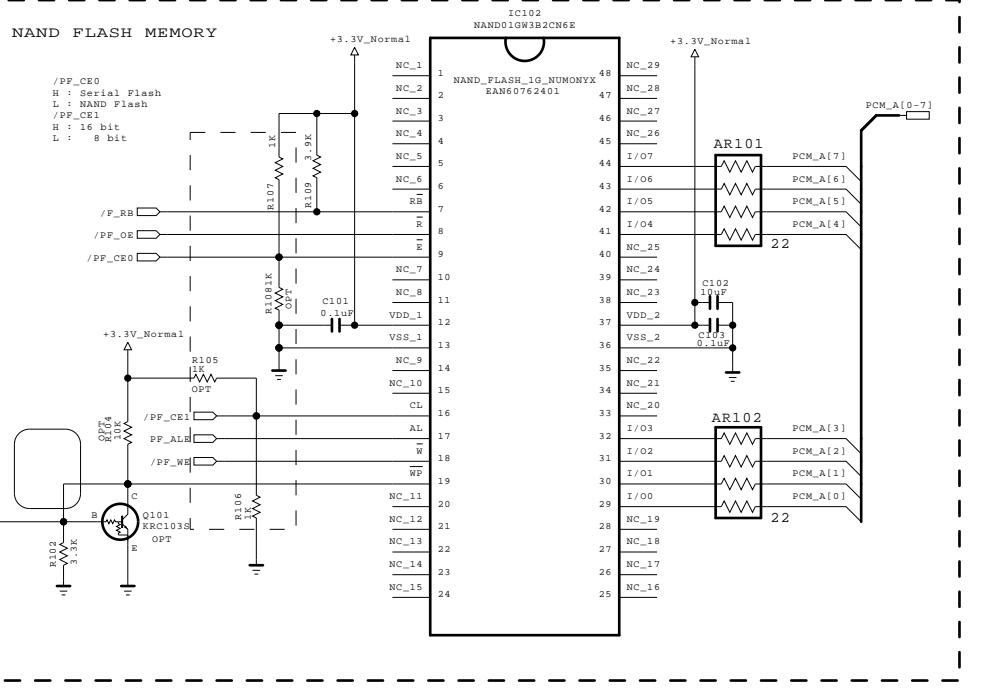


# EXPLODED VIEW

## IMPORTANT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These parts are identified by in the Schematic Diagram and EXPLODED VIEW.  
It is essential that these special safety parts should be replaced with the same components as recommended in this manual to prevent X-RADIATION, Shock, Fire, or other Hazards.  
Do not modify the original design without permission of manufacturer.



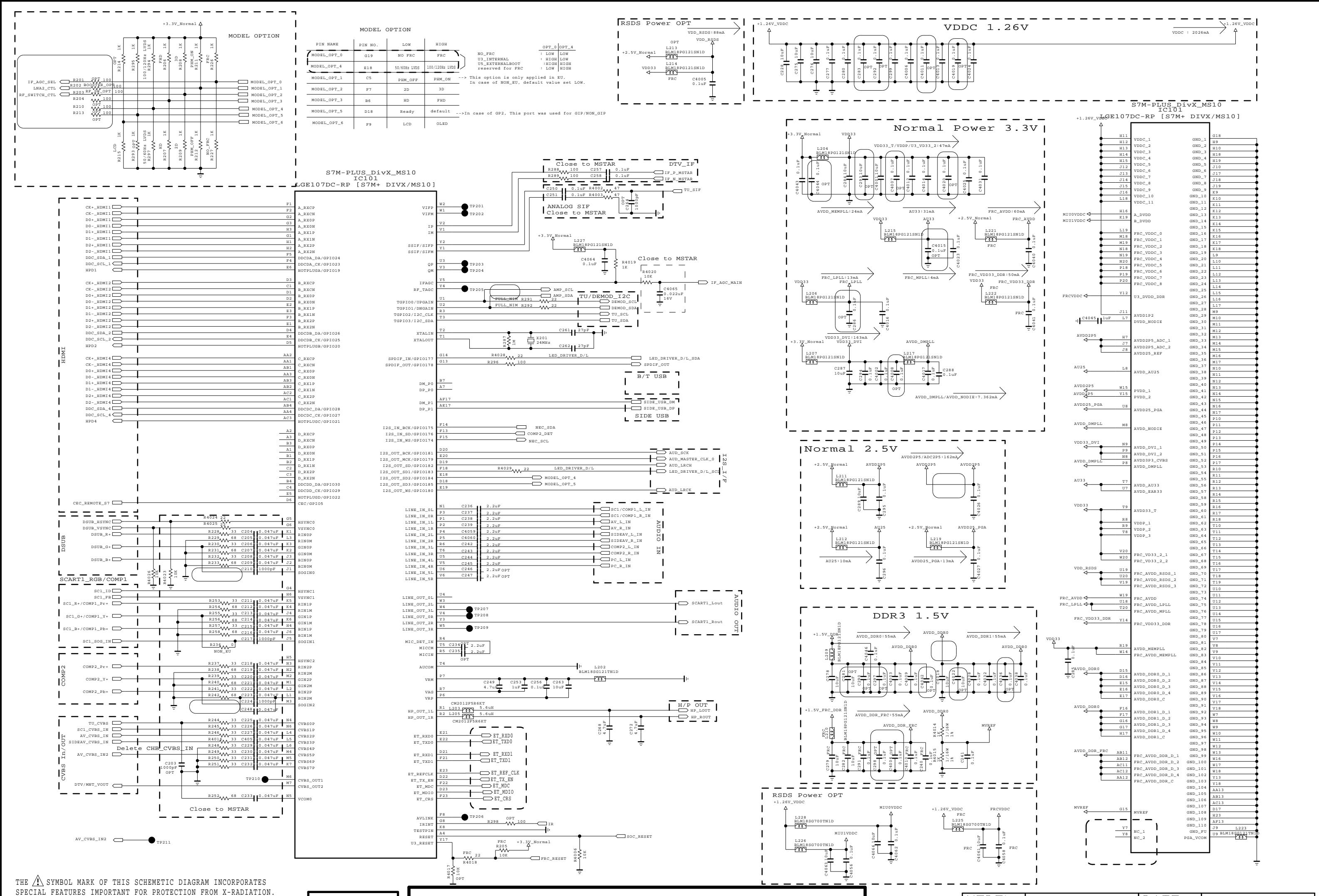


THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FILRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

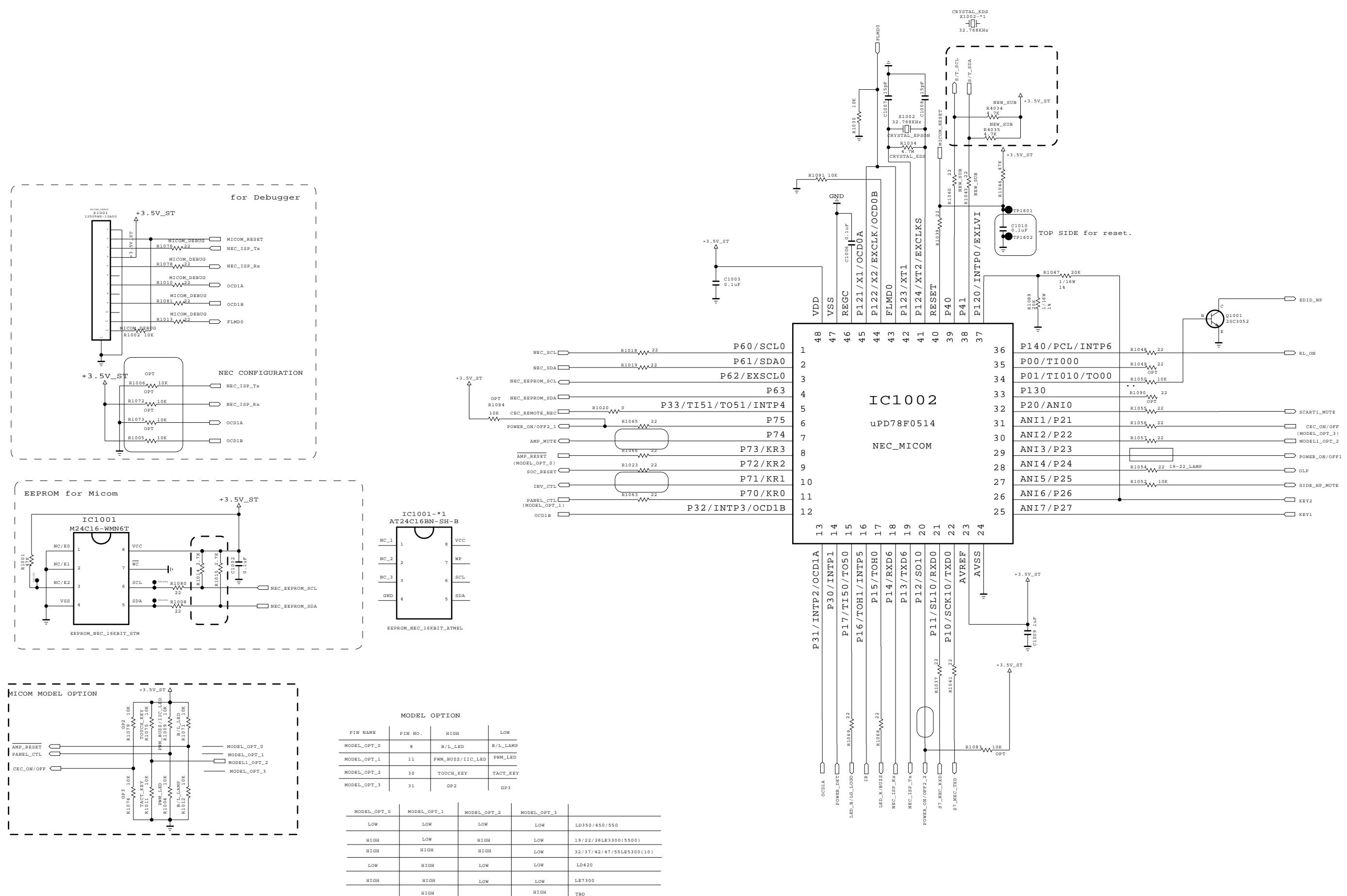
**SECRET**  
LG Electronics

LG ELECTRONICS

<b>MODEL</b>	GP3_Saturn7M	<b>DATE</b>	Ver. 0.1
<b>BLOCK</b>	FLASH/EEPROM/GPIO	<b>SHEET</b>	1



The symbol mark of this schematic diagram incorporates special features important for protection from X-radiation. Filre and electrical shock hazards, when servicing if is essential that only manufacturers specified parts be used for the critical components in the symbol mark of the schematic.

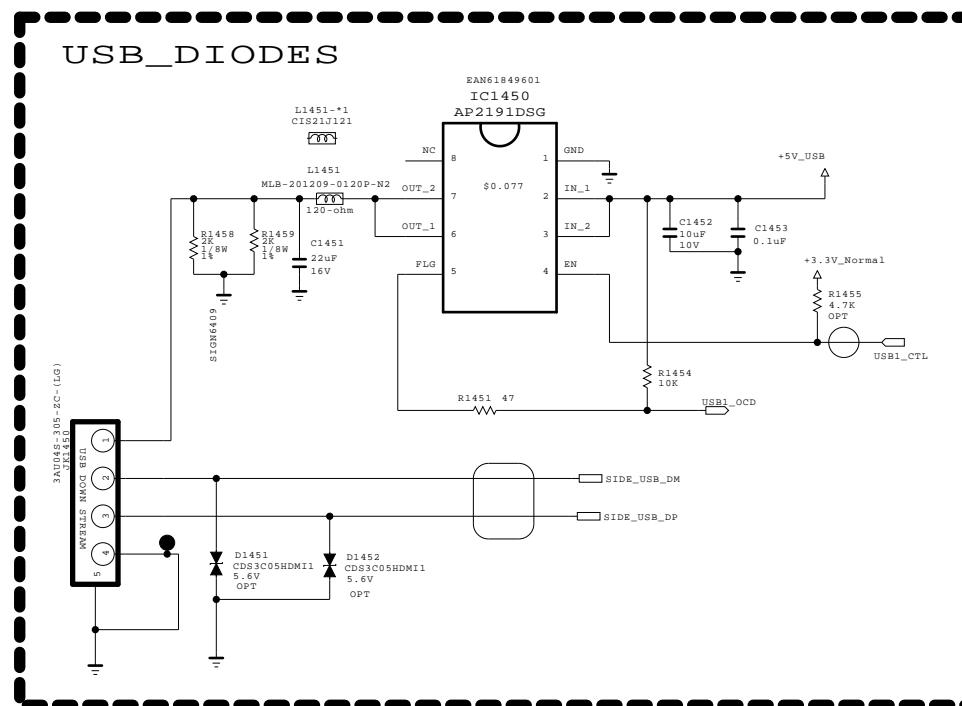


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LG Electronics

LG ELECTRONICS

MODEL BLOCK	GP2R	DATE SHEET	20101023
			5

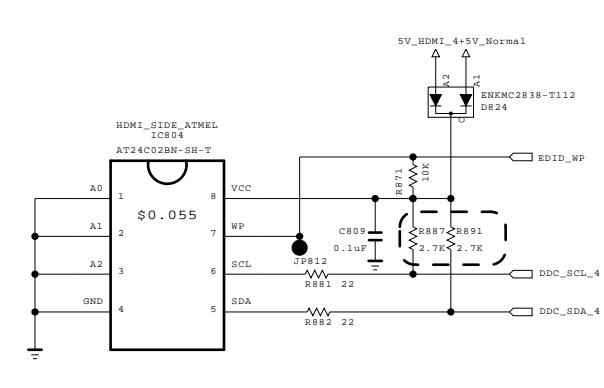
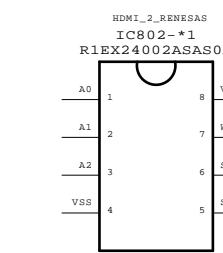
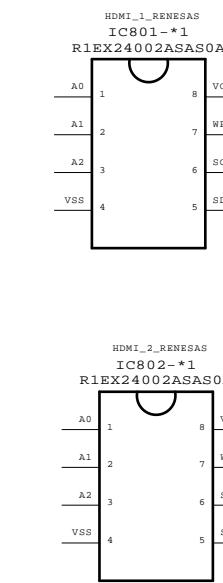
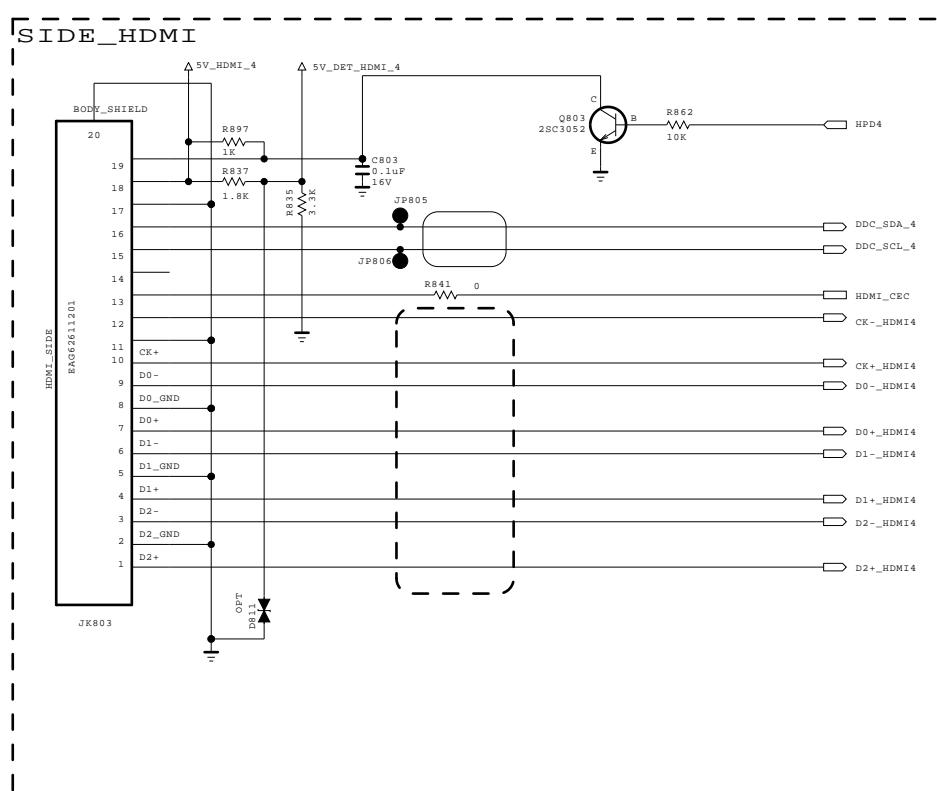
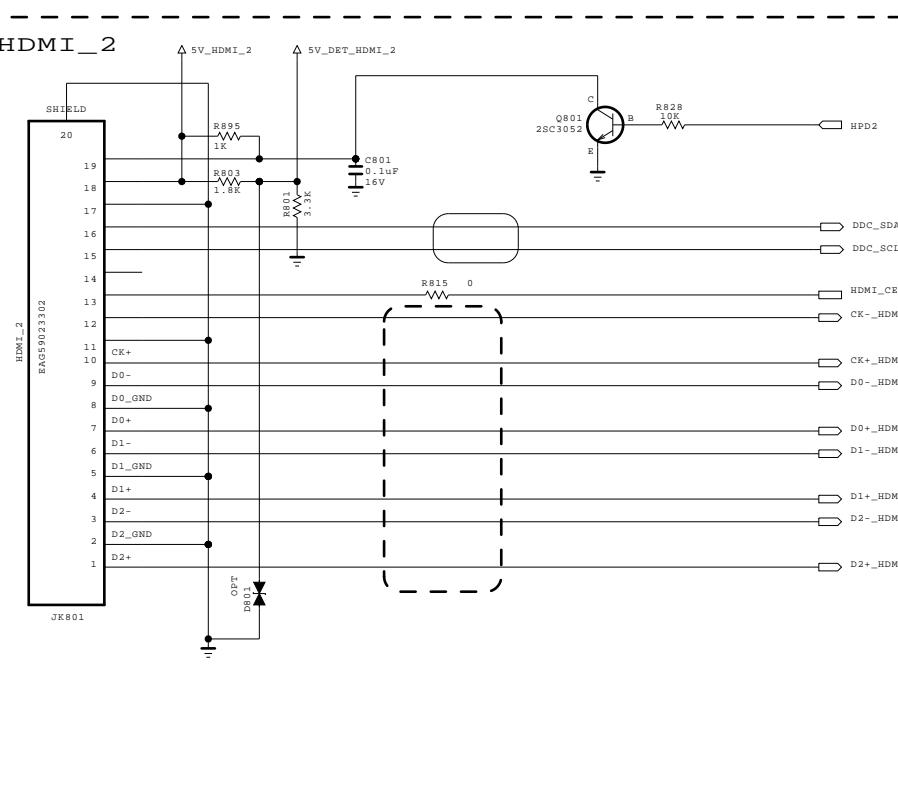
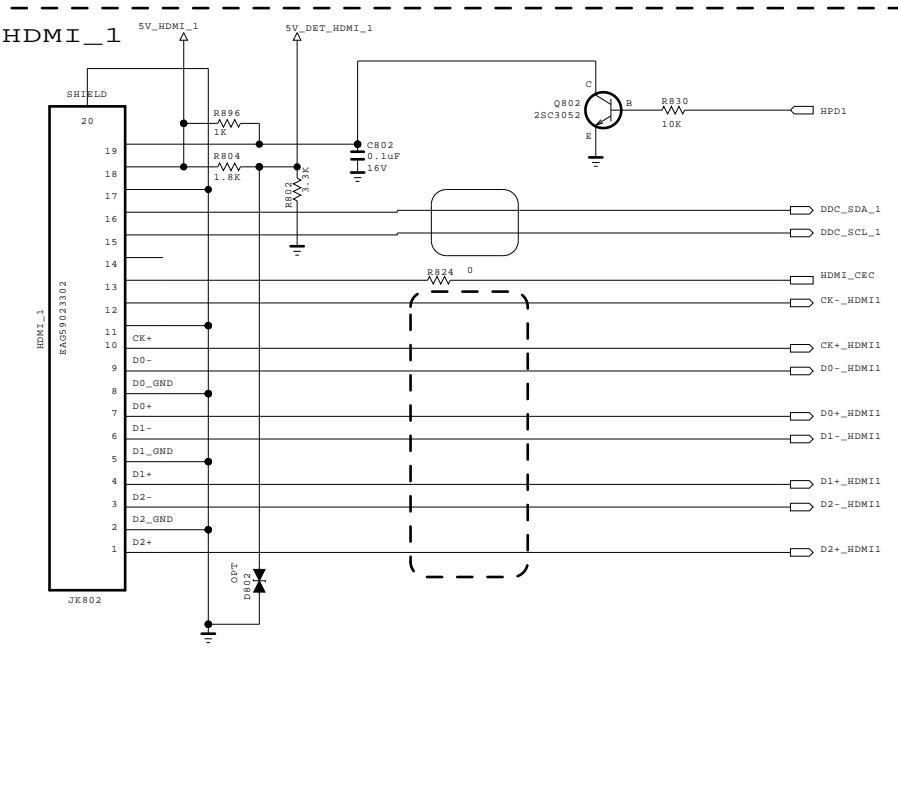
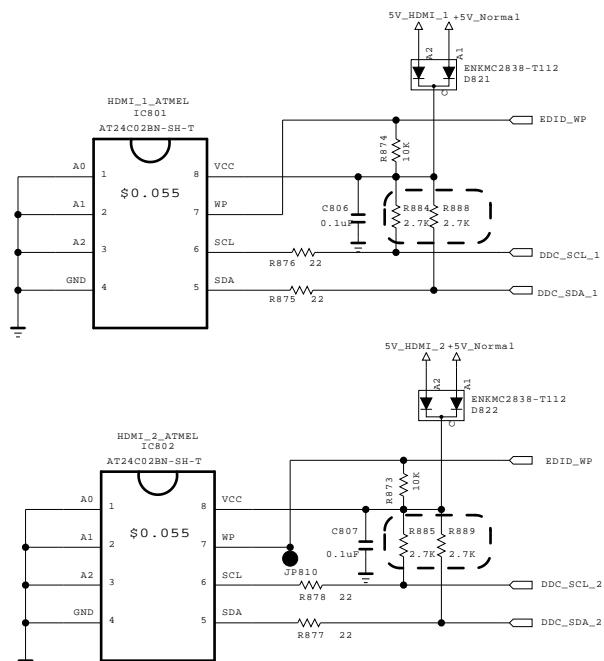


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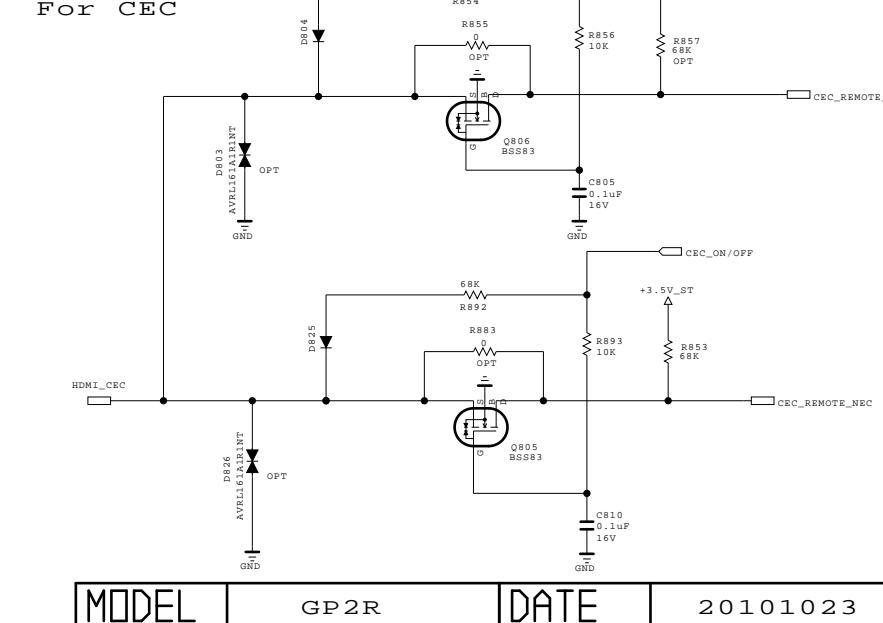
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LG Electronics

LG ELECTRONICS

MODEL	GP2R	DATE	20101023
BLOCK	USB_OCP_DIODE	SHEET	7 /



FOR CEC



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LG Electronics

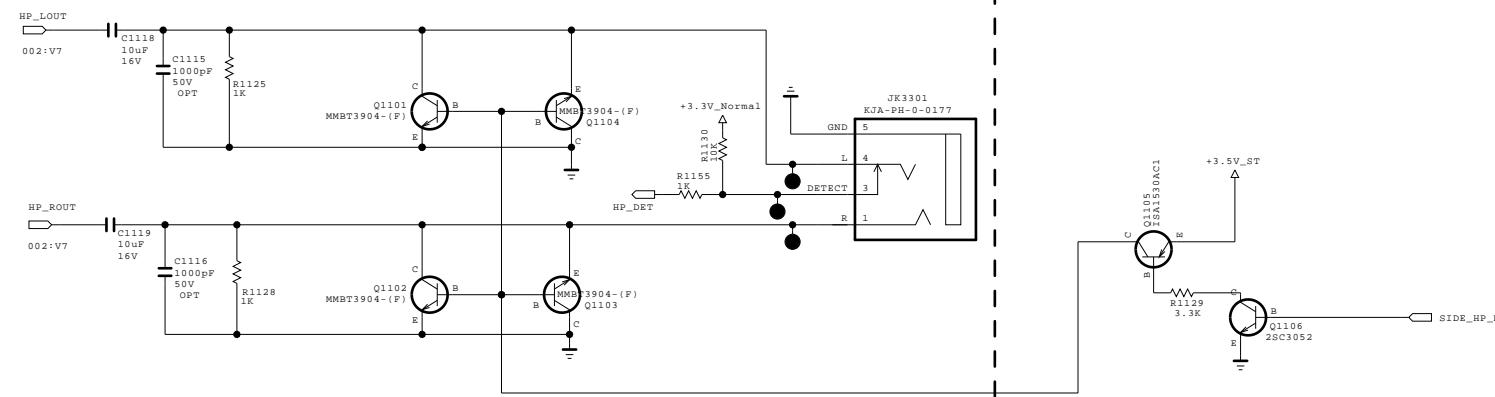
LG ELECTRONICS

MODEL	GP2R	DATE	20101023
BLOCK	HDMI	SHEET	8

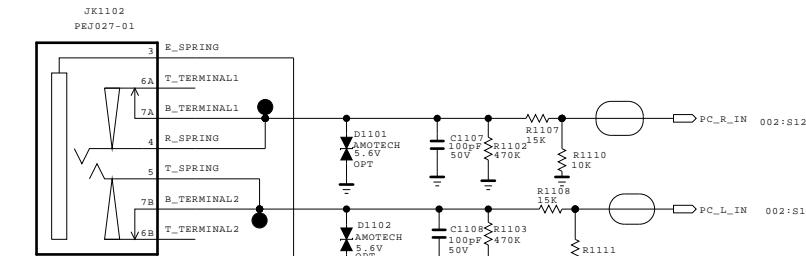
# RGB / SPDIF / PC / HP

## New Item Development

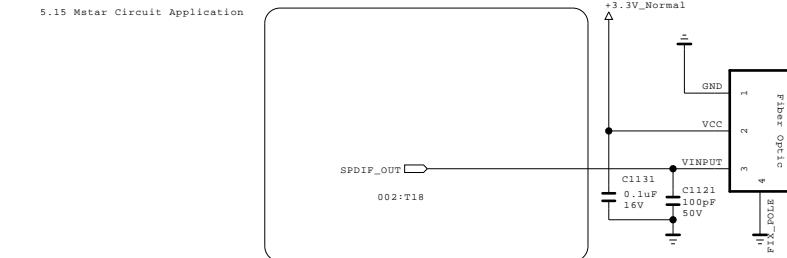
### EARPHONE BLOCK



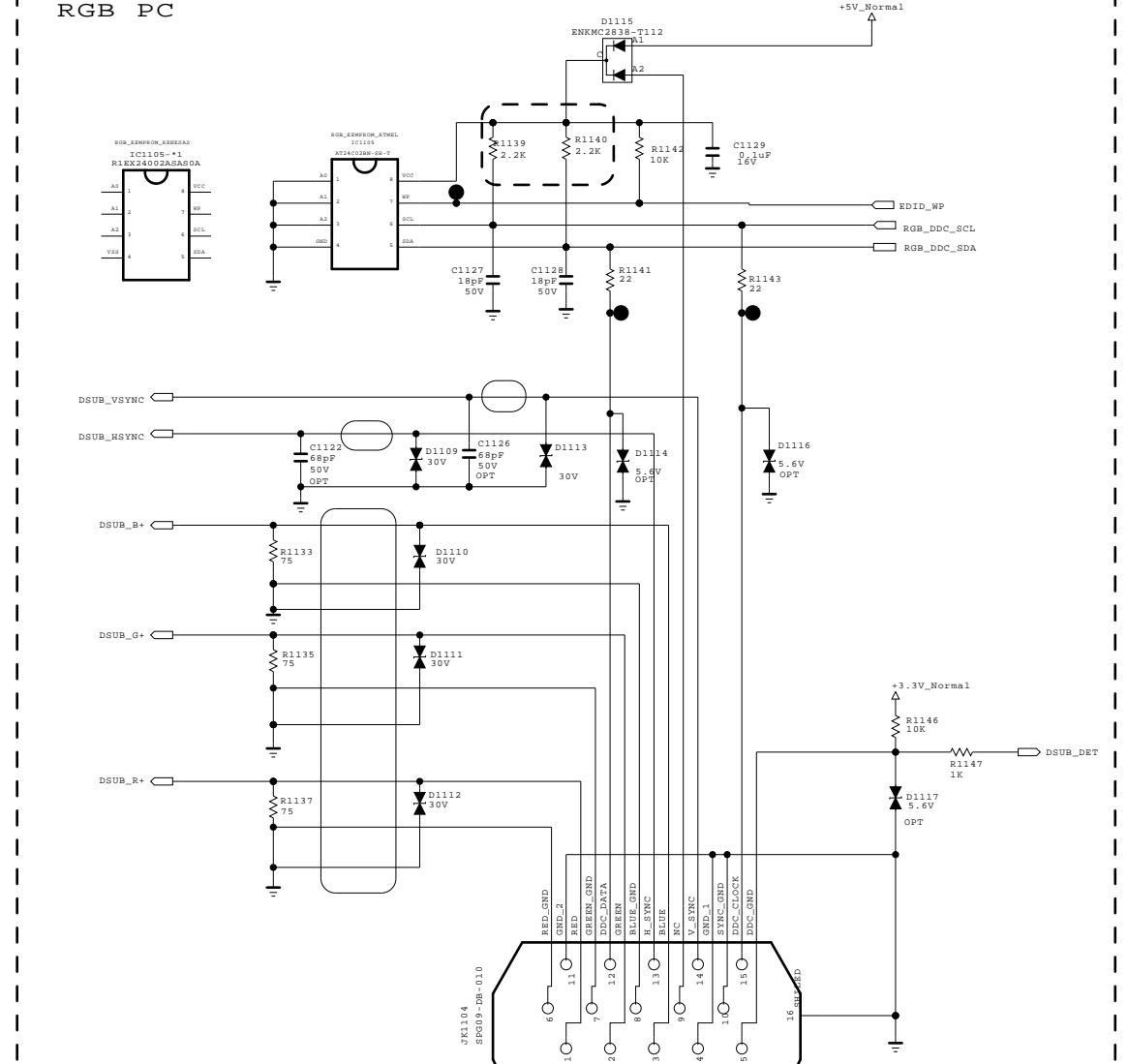
### PC AUDIO



### SPDIF OPTIC JACK



### RGB PC

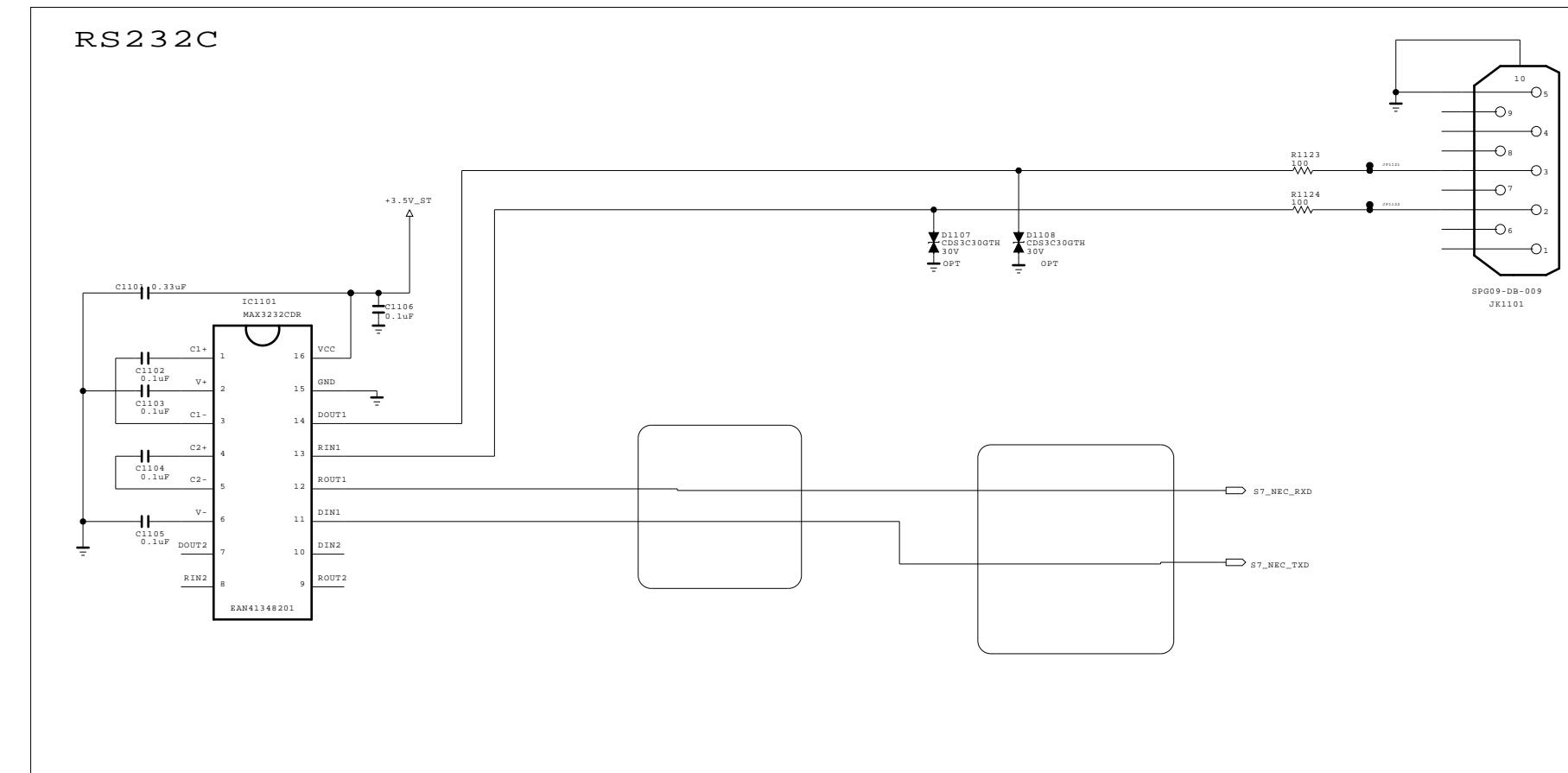


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MODEL <b>BLOCK</b>	GP2R	DATE <b>SHEET</b>	20101023
			9

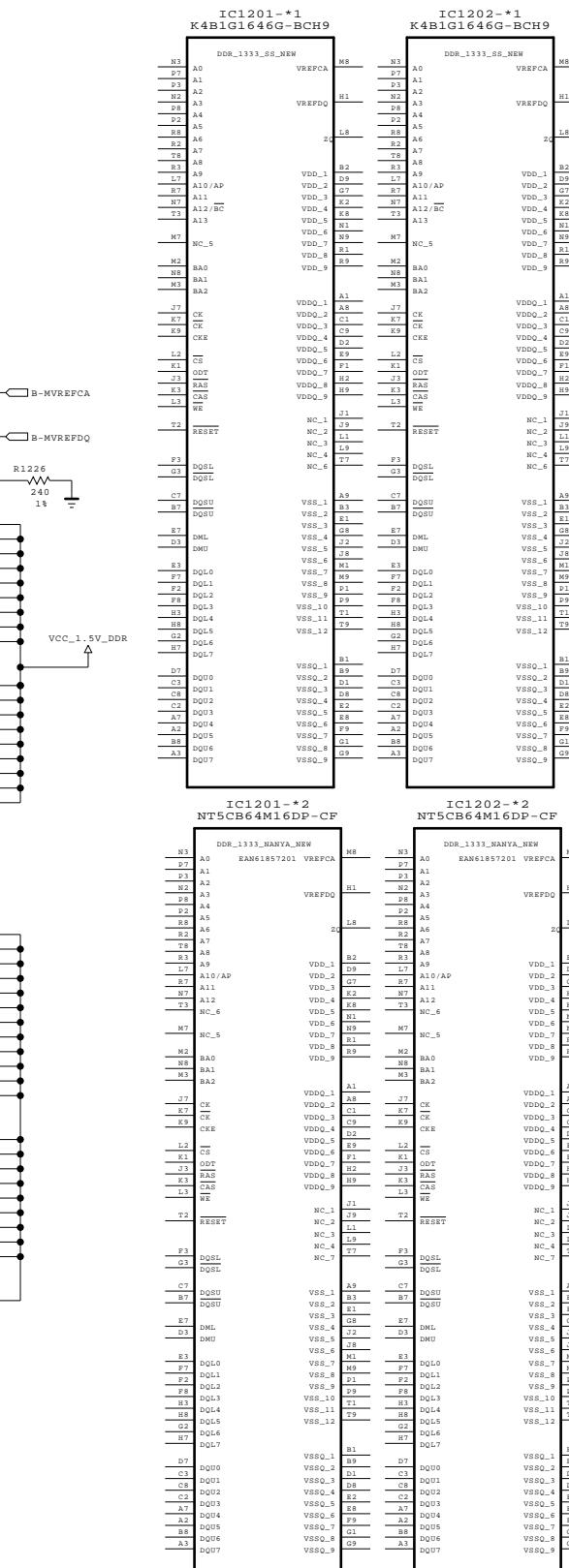
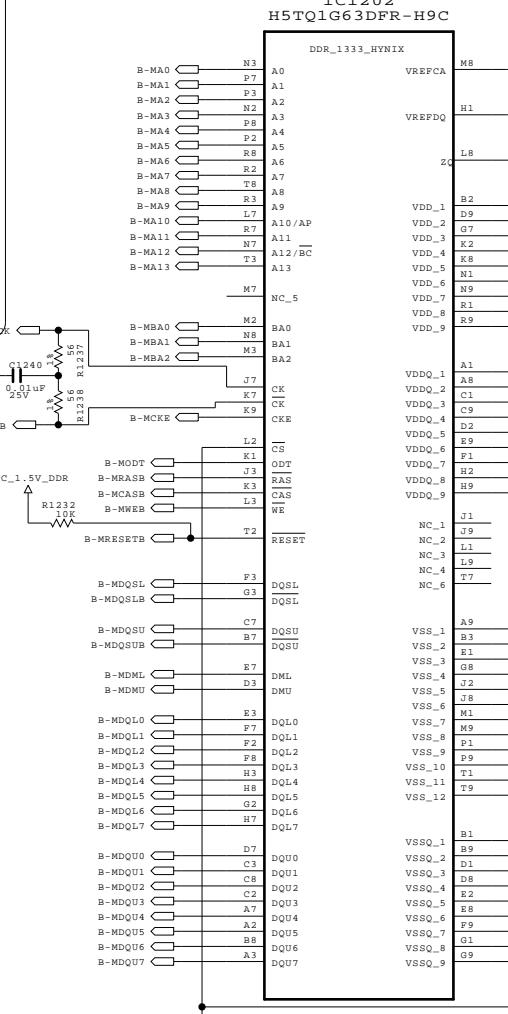
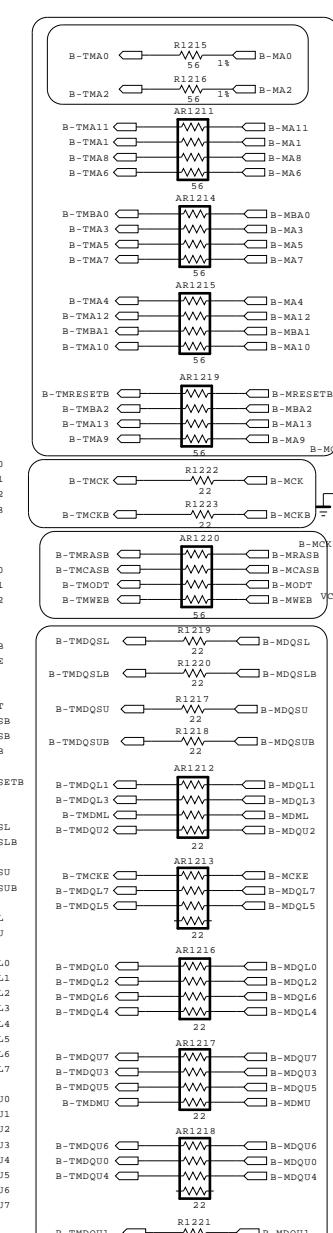
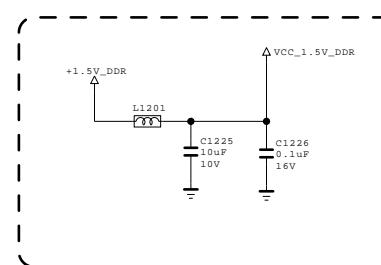
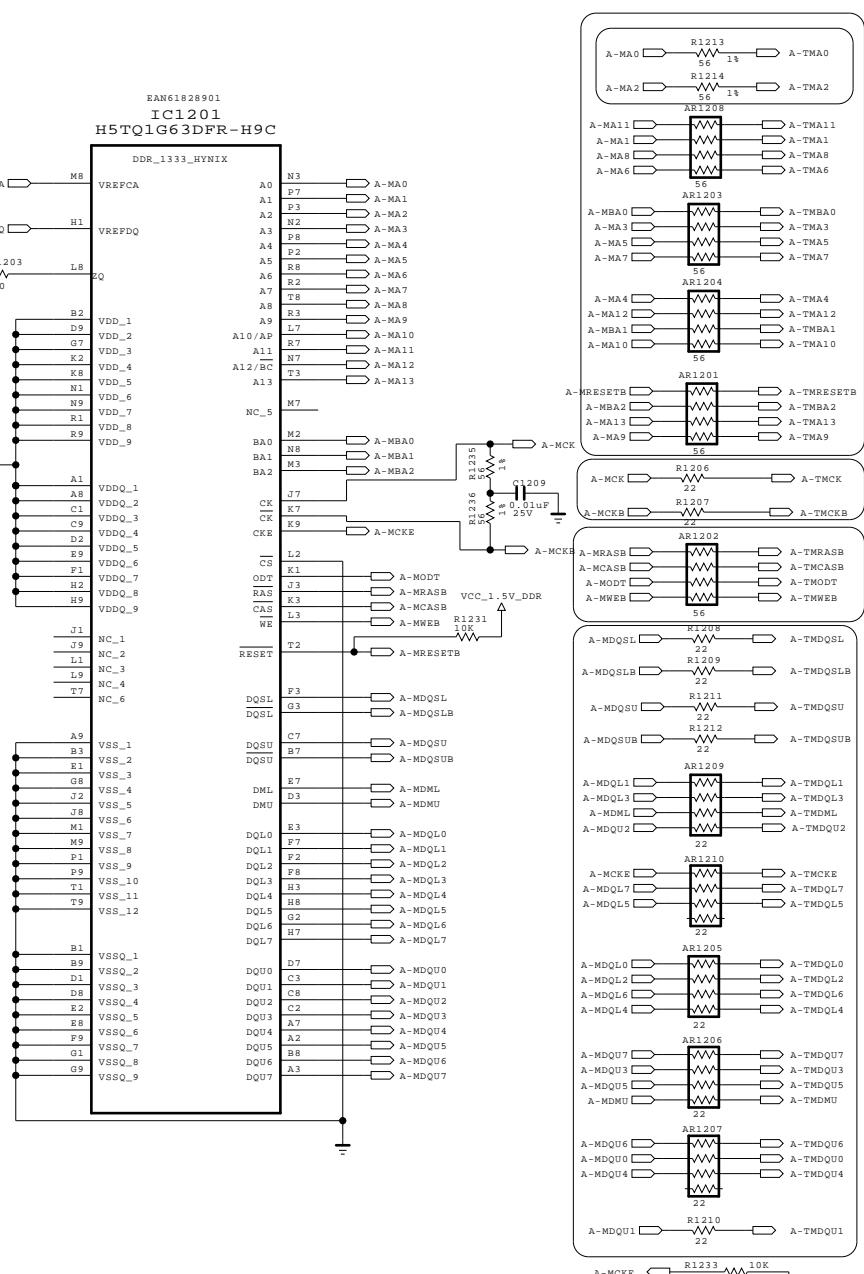
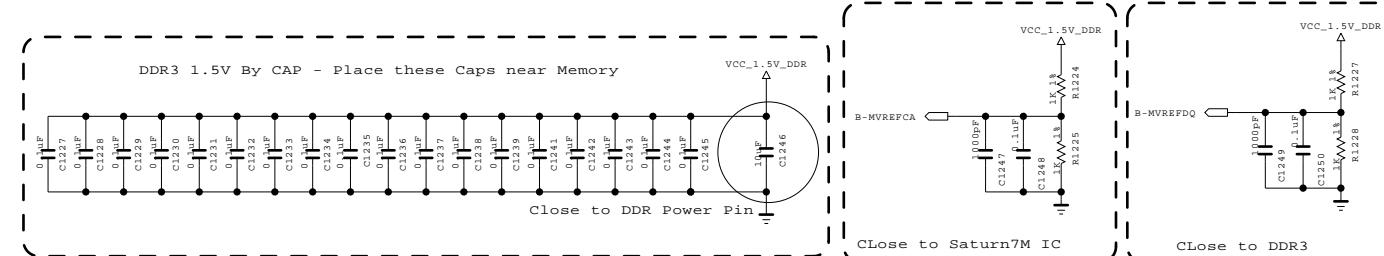
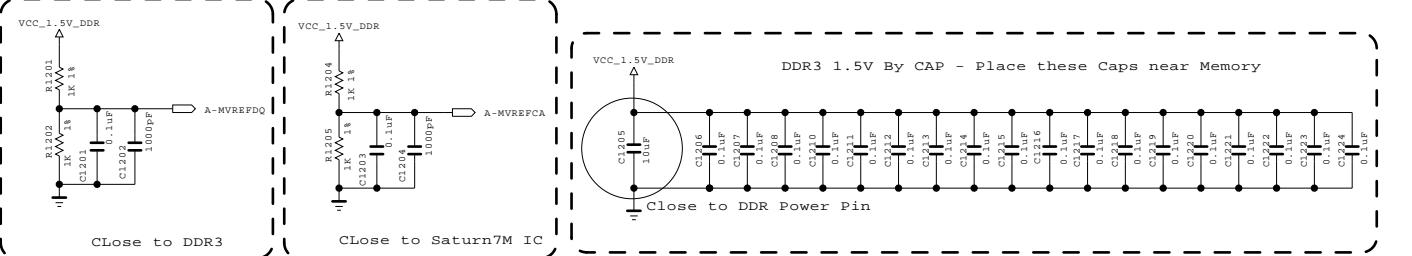


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LG ELECTRONICS

MODEL	GP2R	DATE	20101023
BLOCK	RS232C_9PIN	SHEET	10 /

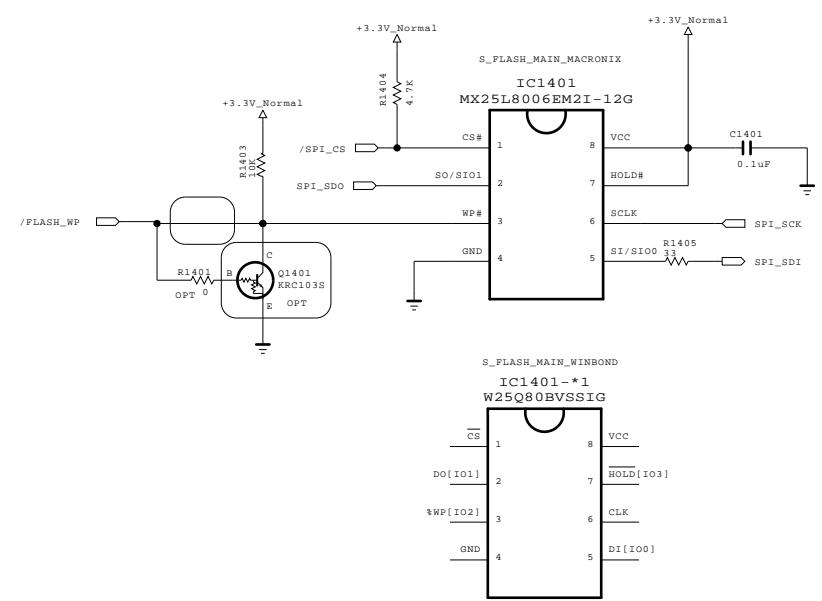


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MODEL	GP2R	DATE	20101023
BLOCK	DDR 256	SHEET	12 /



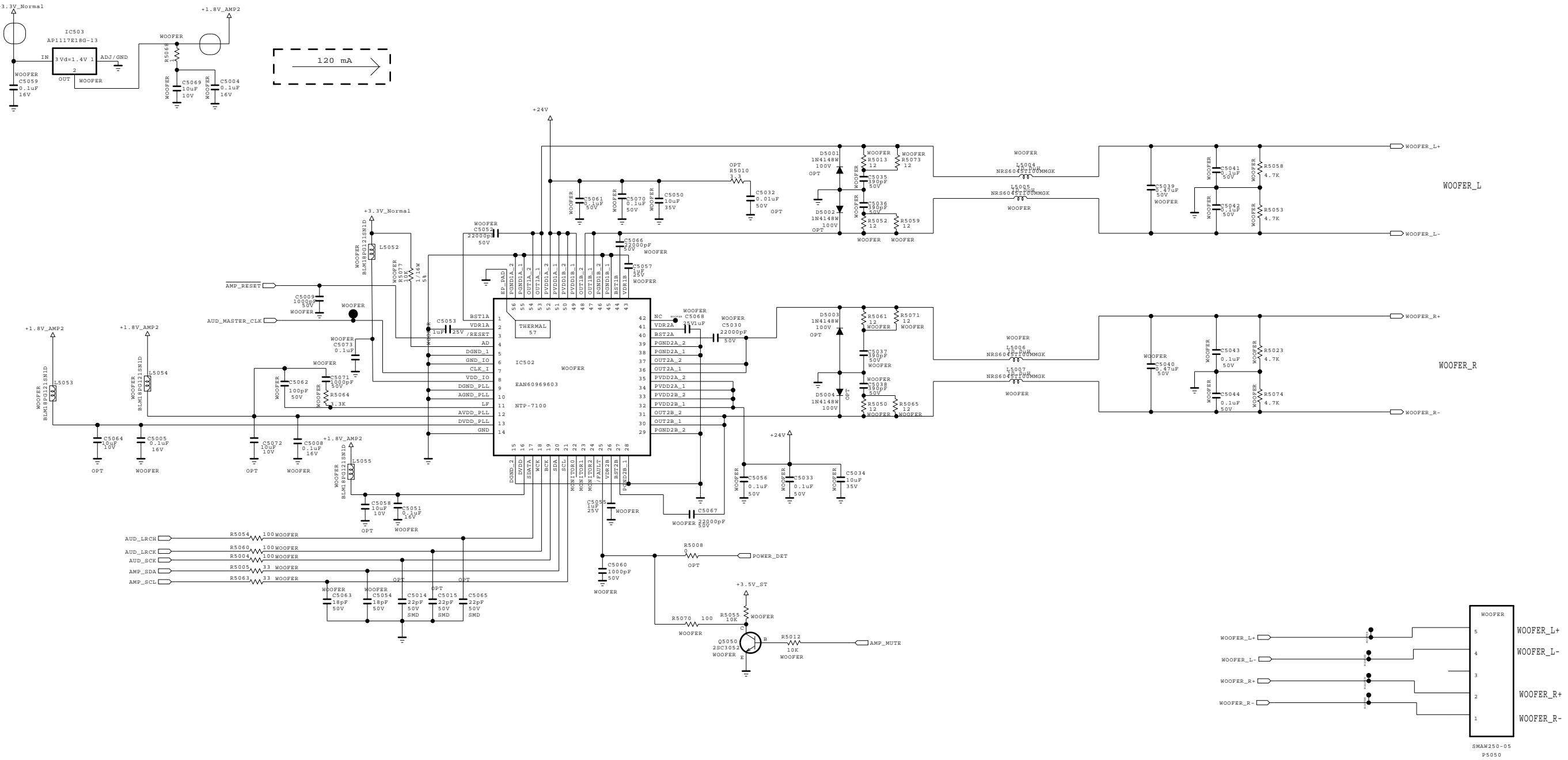
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MODEL	GP2R	DATE	20101023
BLOCK	SFLASH_1MB	SHEET	13 /

# WOOFER AMP



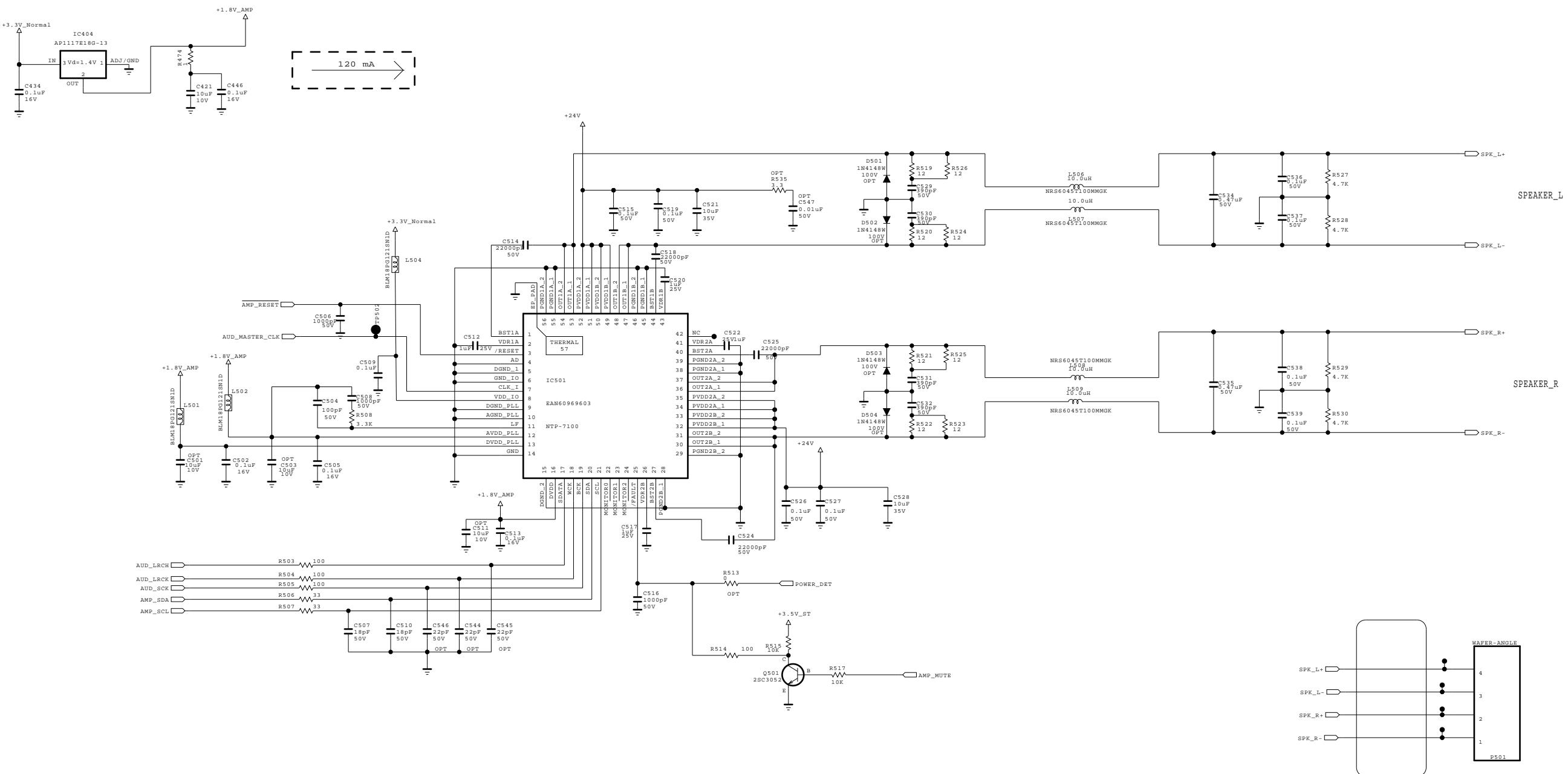
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SECRET



LG ELECTRONICS

MODEL	GP2R	DATE	20101023
BLOCK	WOOFER_NTB	SHEET	15 /

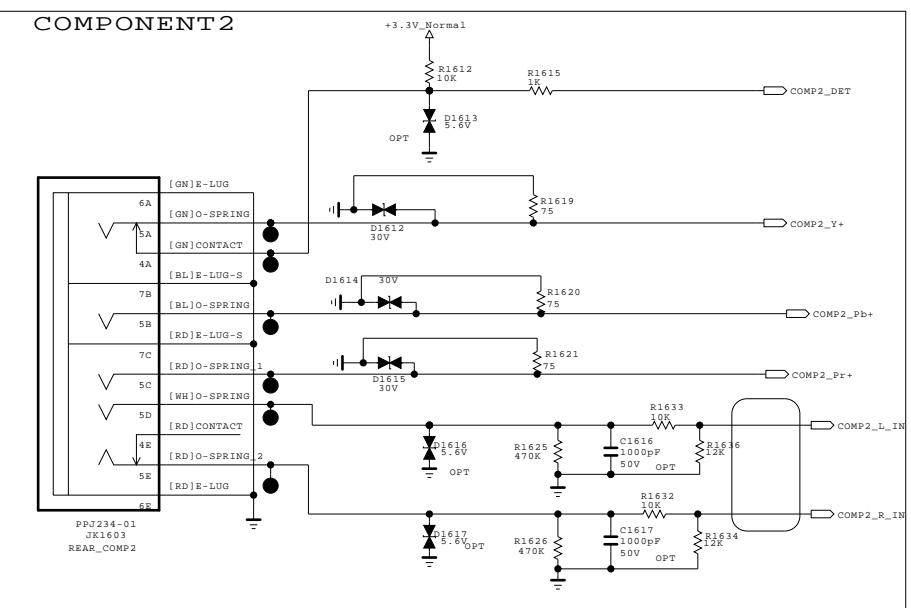
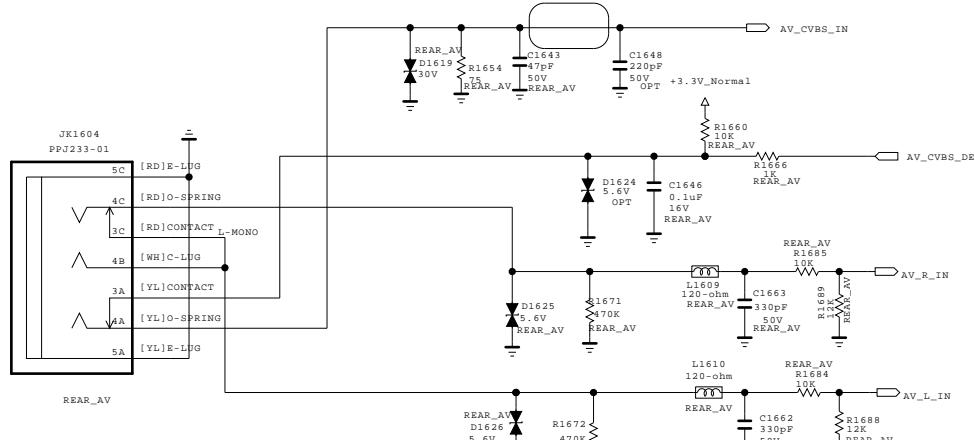


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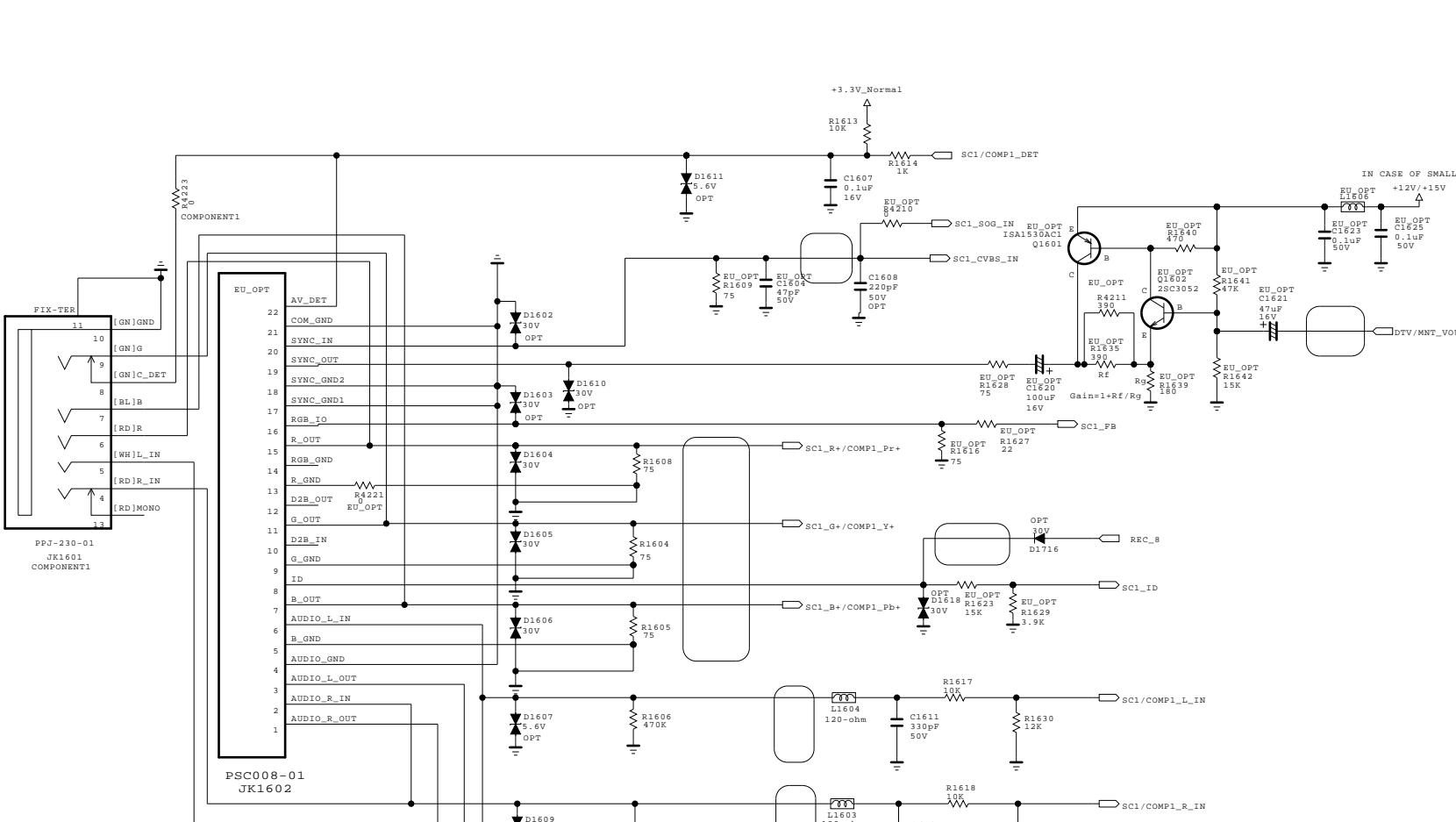
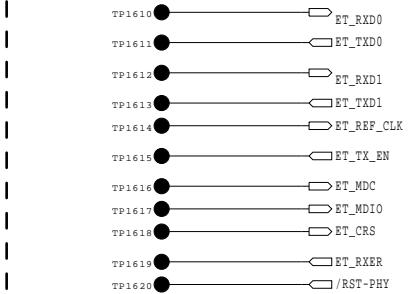
**SECRET**  
LG Electronics

LG ELECTRONICS

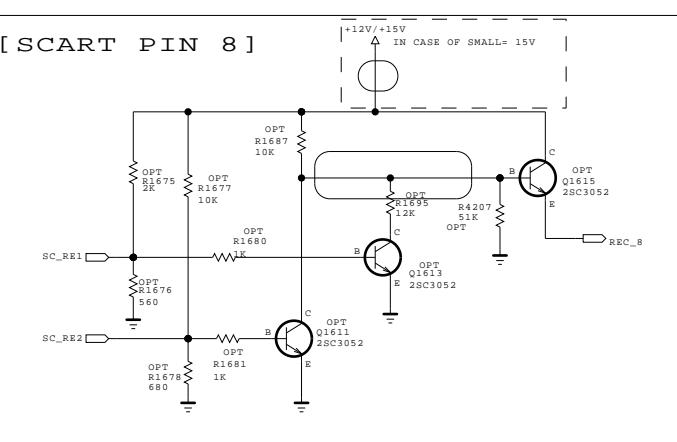
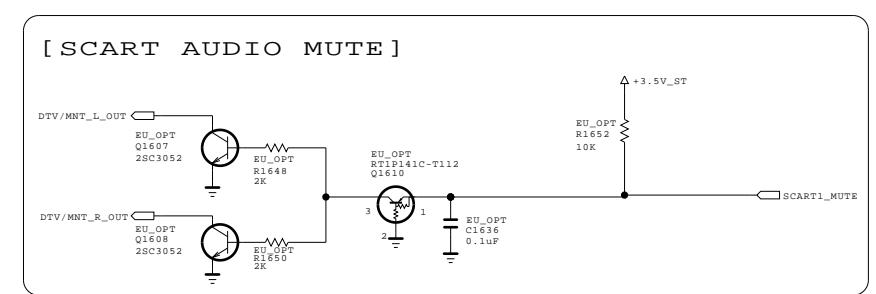
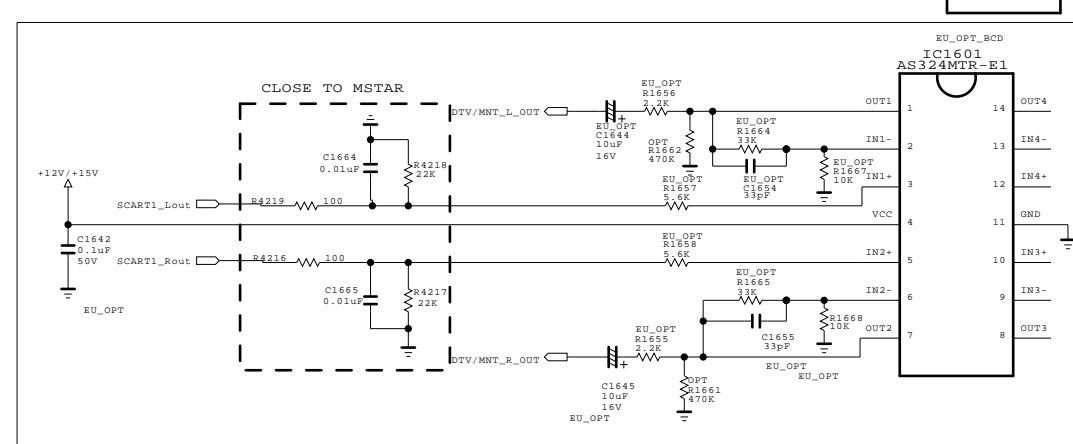
MODEL	GP2R	DATE	20101023
BLOCK	AMP_NTP	SHEET	16 /



## ETHERNET FOR DVB\_T2

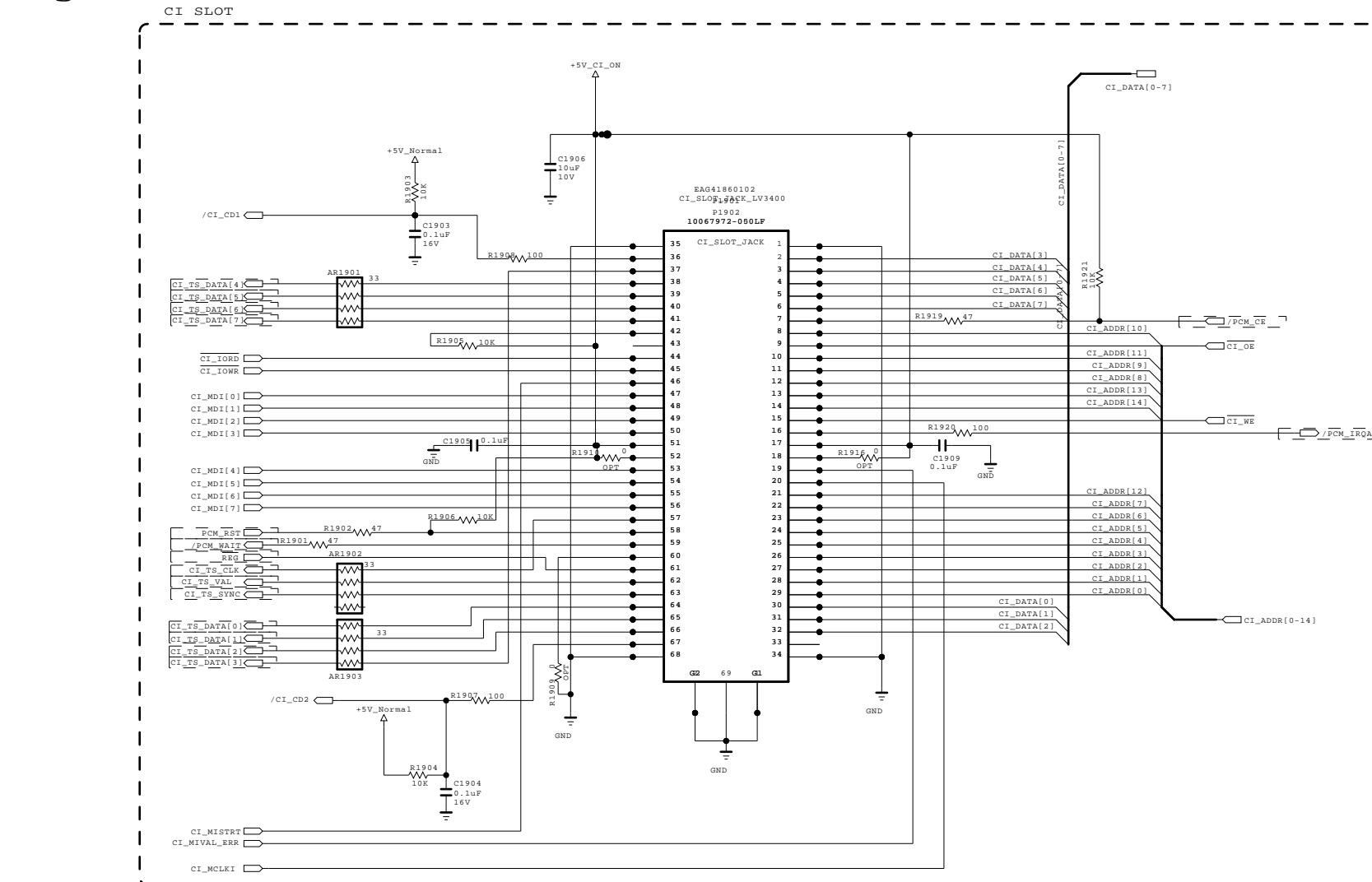


Full Scart/ Compl1

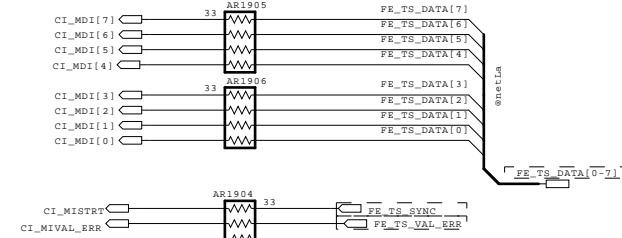


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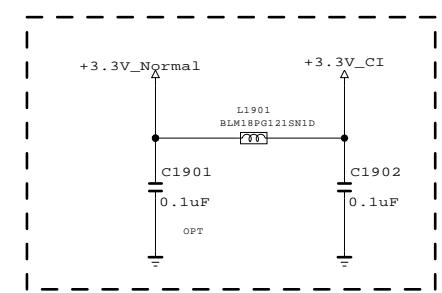
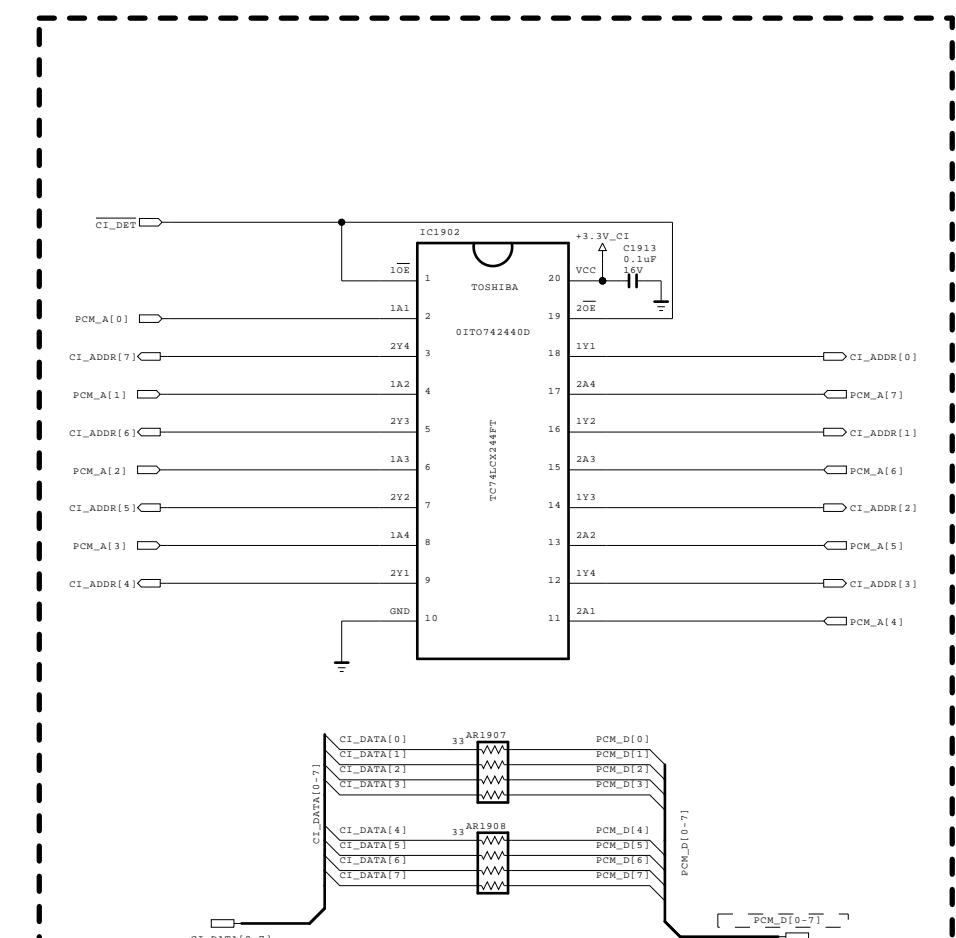
## CI Region



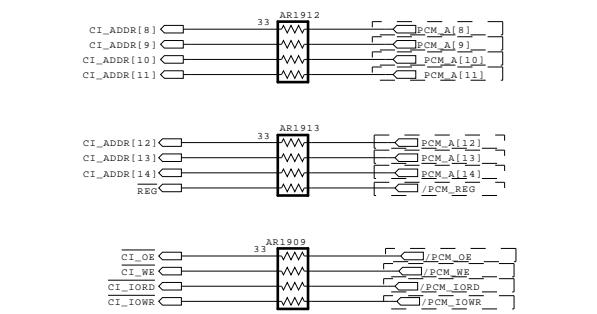
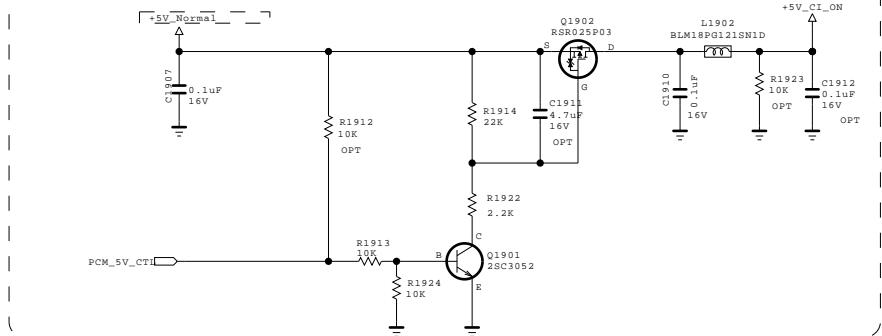
## CI TS INPUT



## CI HOST I/F



## CI POWER ENABLE CONTROL



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**SECRET**  
LG Electronics

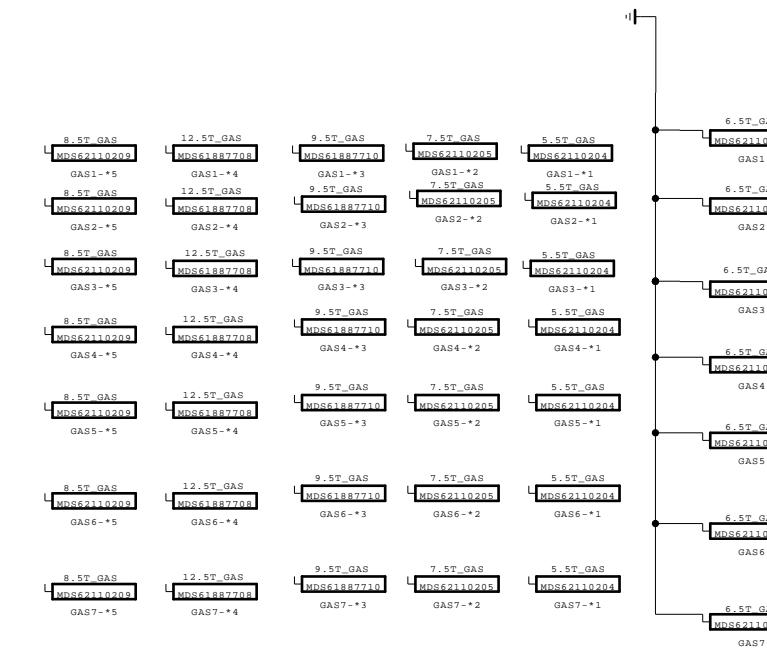
LG ELECTRONICS

MODEL	GP2R	DATE	20101023
BLOCK	PCMCIA	SHEET	20

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**SECRET**  
LG Electronics

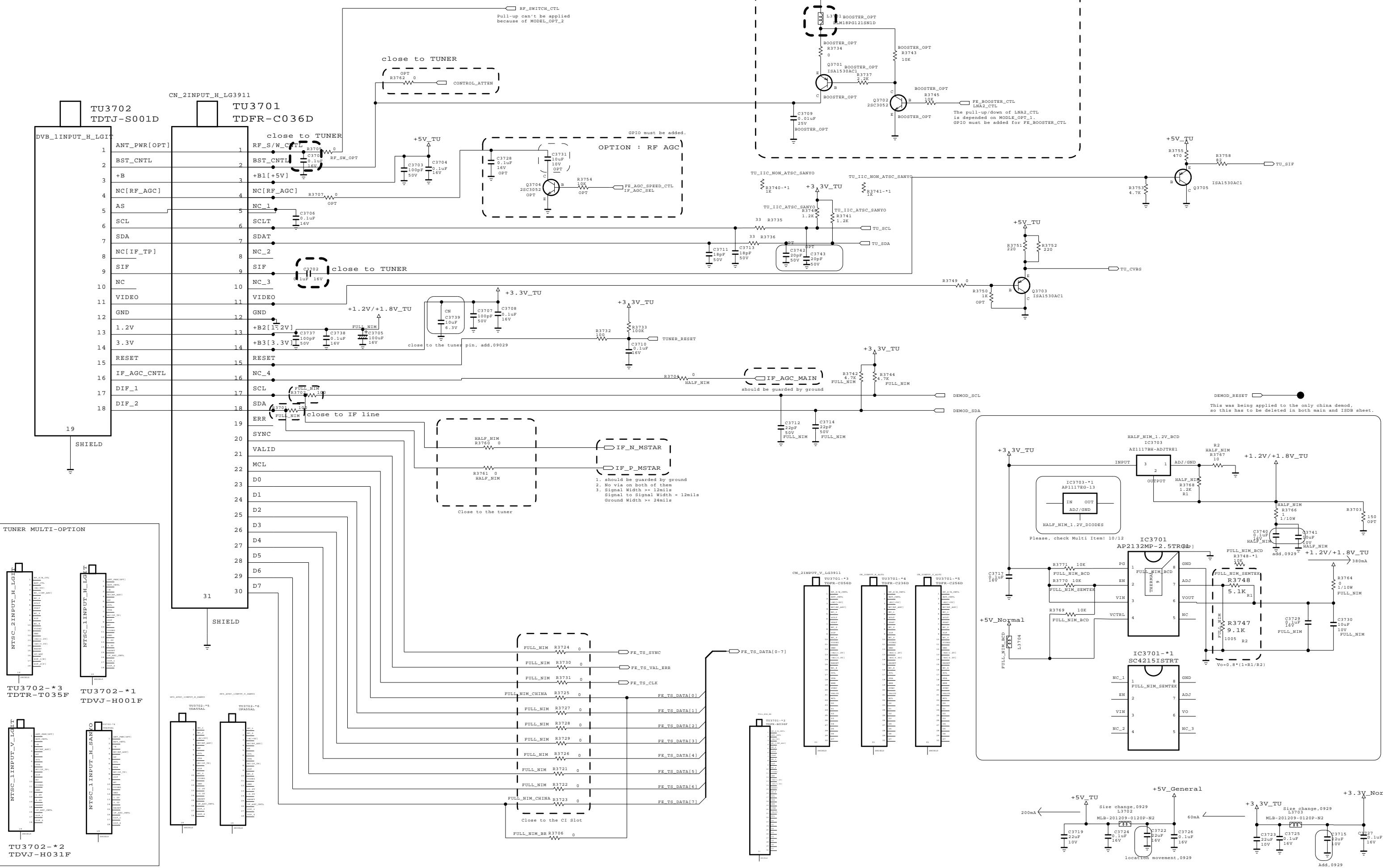
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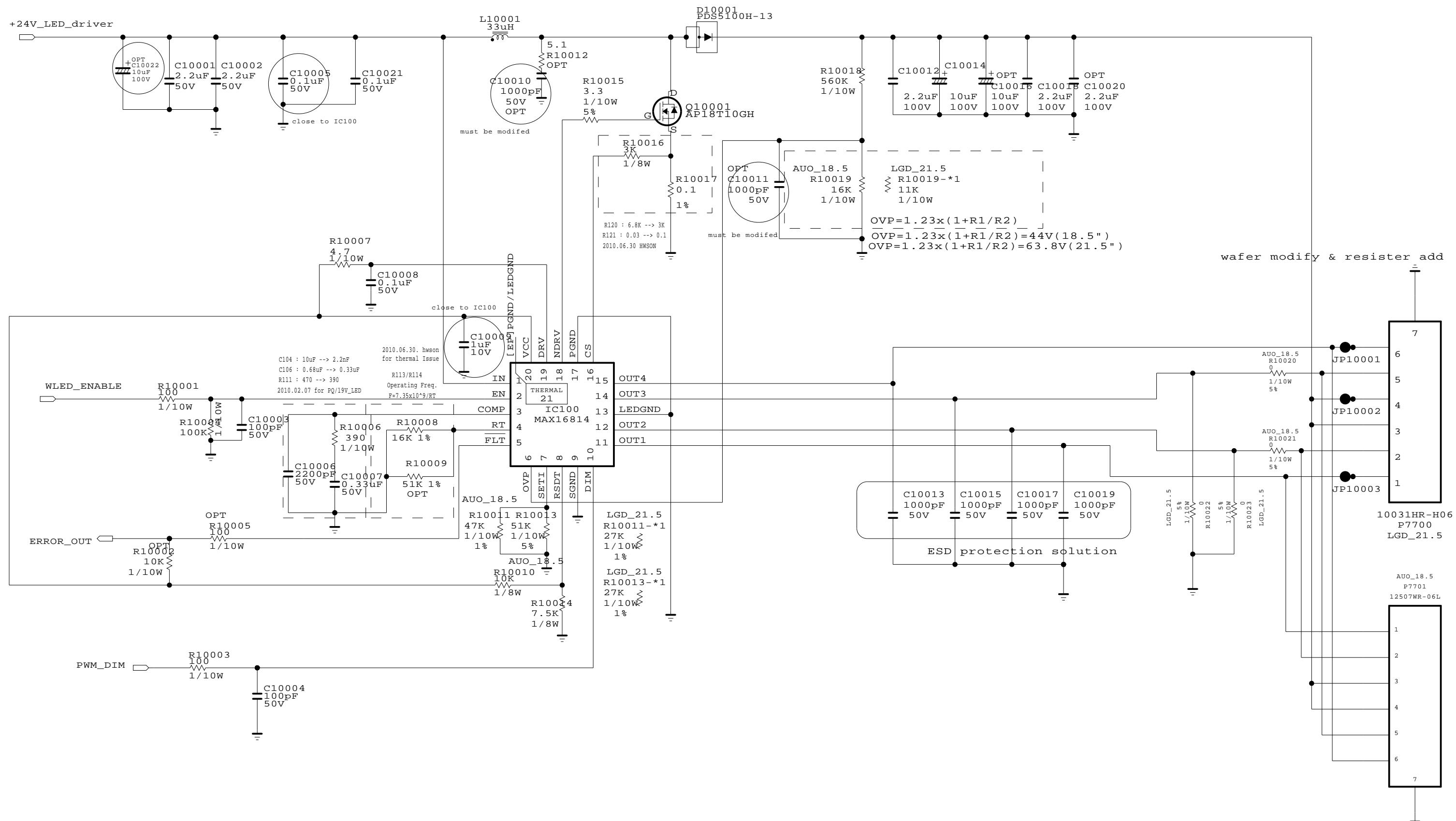
 **LG ELECTRONICS**

MODEL	G P 2 R	DATE	20101023
BLOCK	SMD_GAS	SHEET	20

# GP2R\_GLOBAL\_TUNER\_BLOCK for Small Model



# TN\_module\_LED\_DRIVER\_CIRCUIT



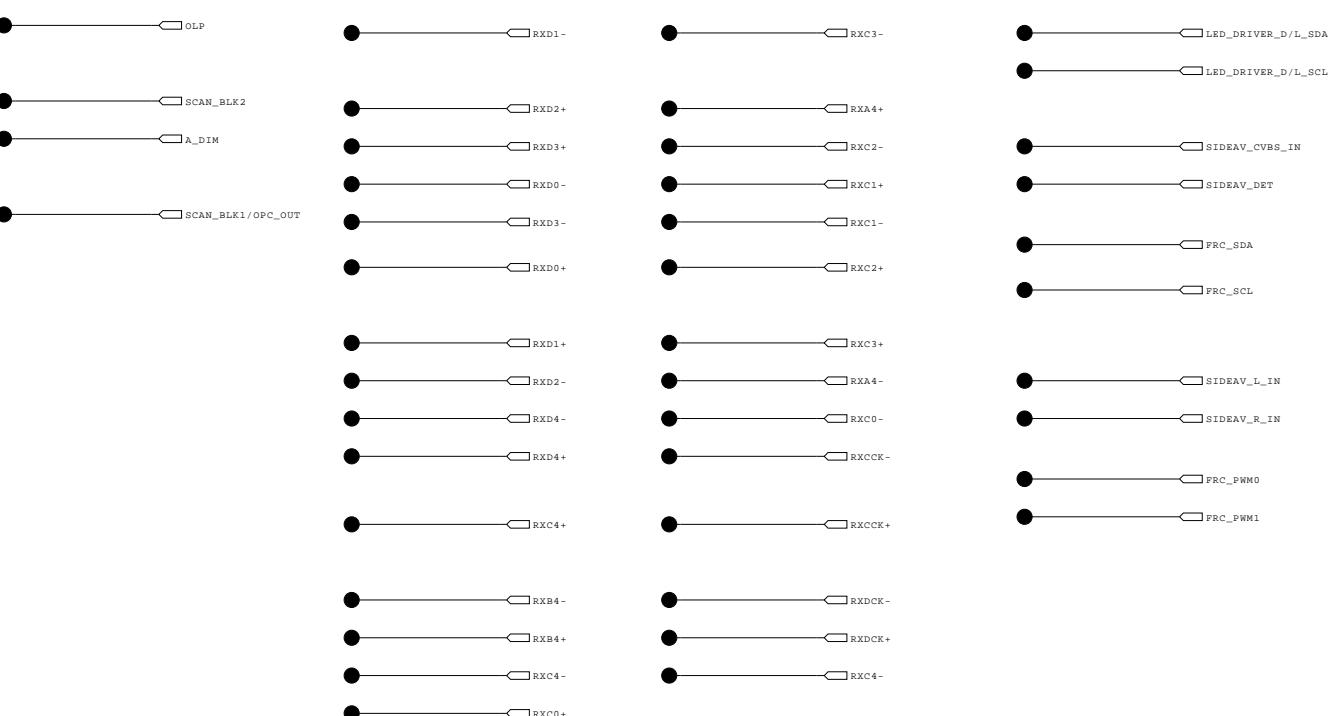
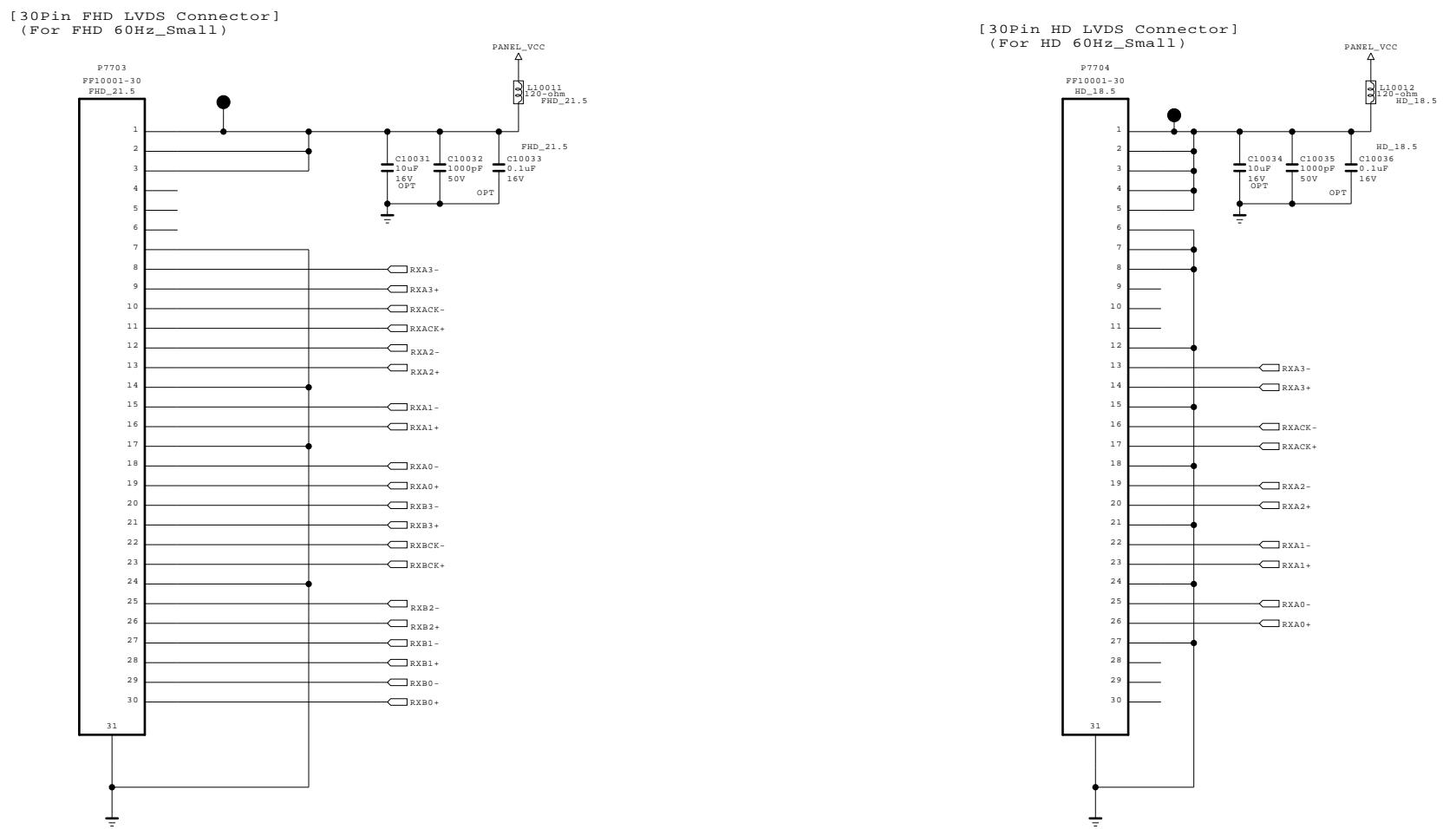
THE SYMBOL MARK OF THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION. FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IF IS ESSENTIAL THAT ONLY MANUFACTURES SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SYMBOL MARK OF THE SCHEMATIC.

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MODEL	GP2R	DATE	20101023
BLOCK	TN_DRIVER	SHEET	29

# LVDS TN



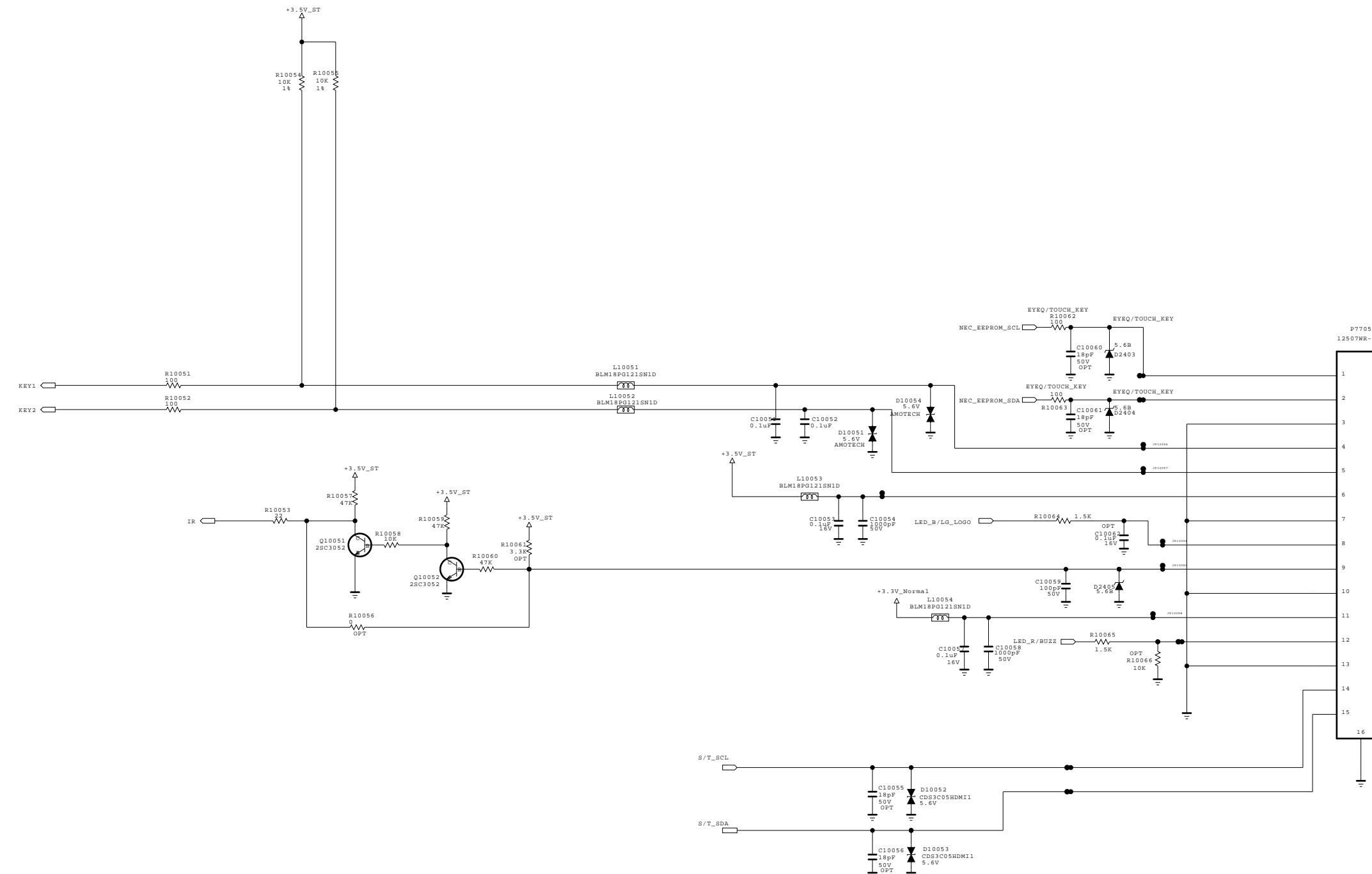
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MODEL	GP2R	DATE	20101023
BLURK	TN LVDS	SHEET	30 /

# TN CONTROL IR & LED

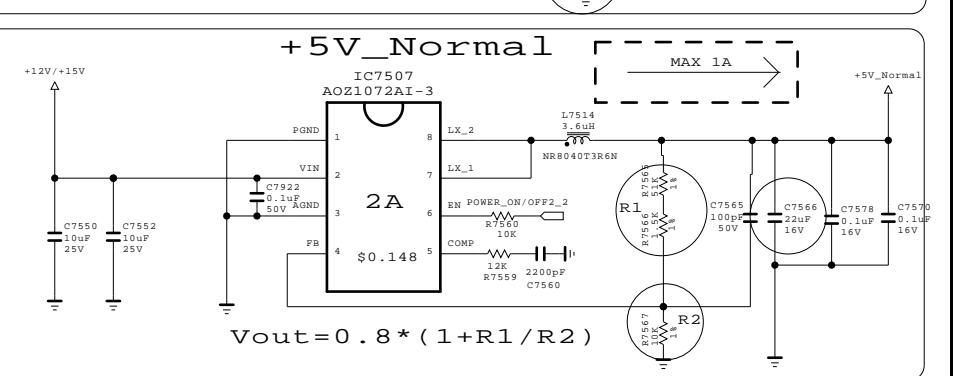
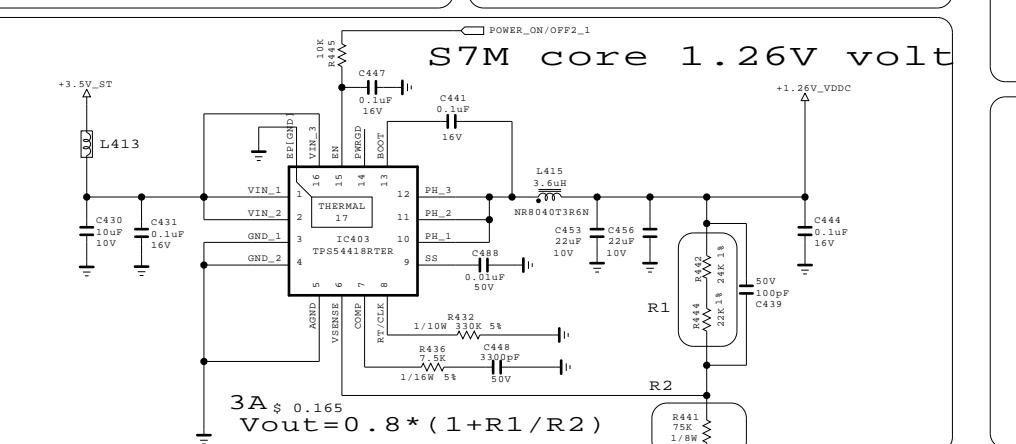
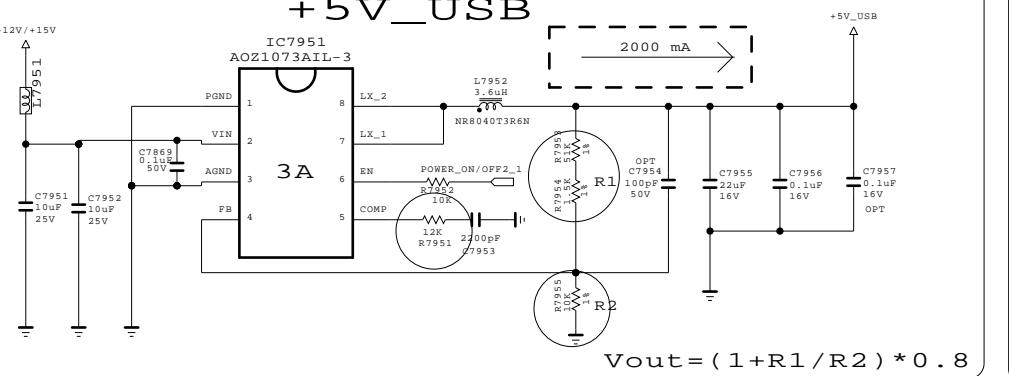
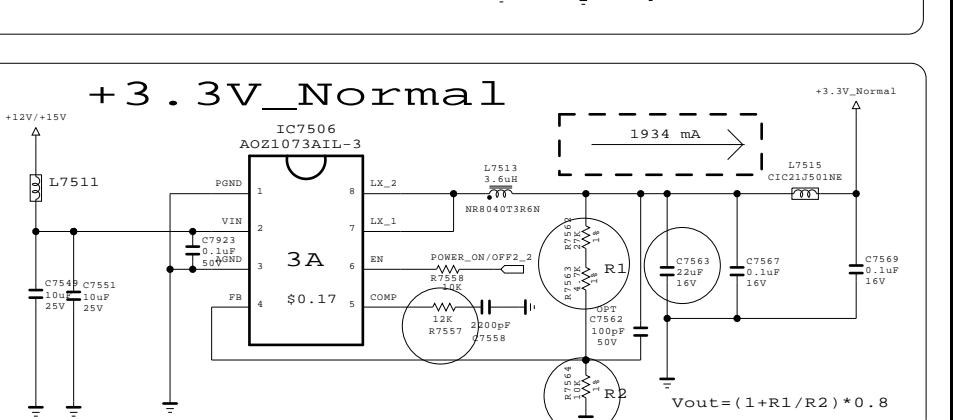
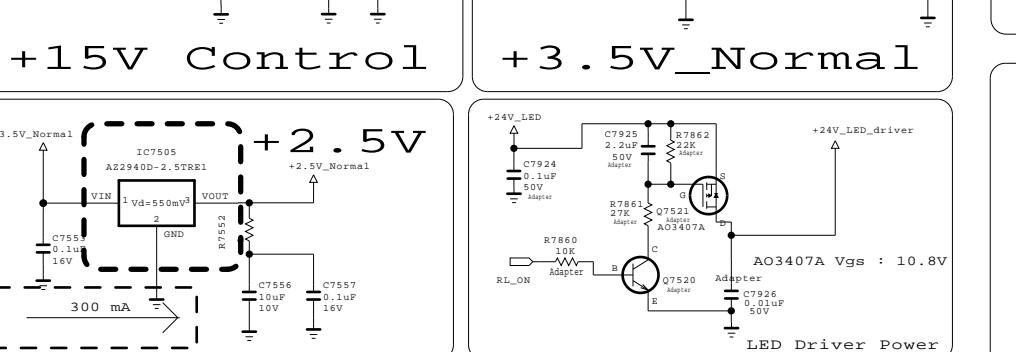
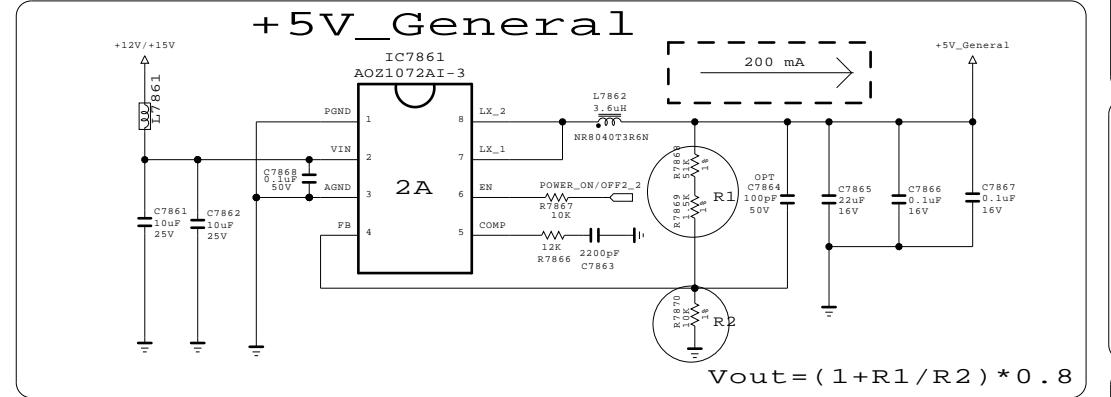
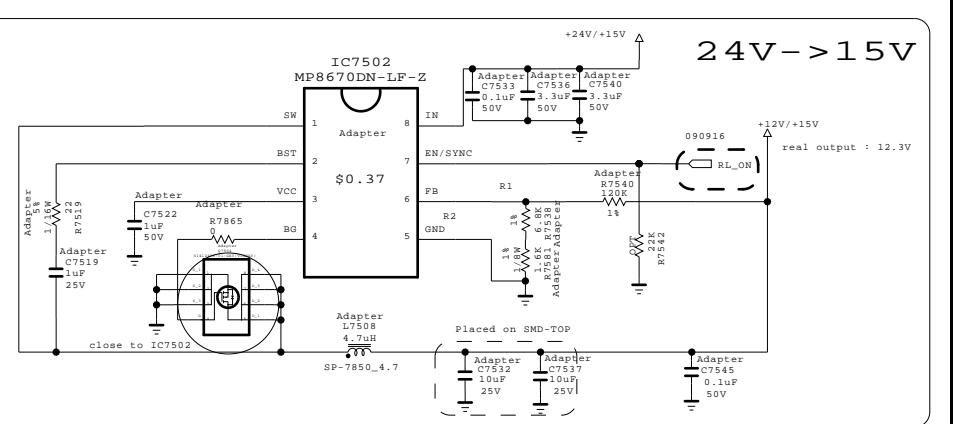
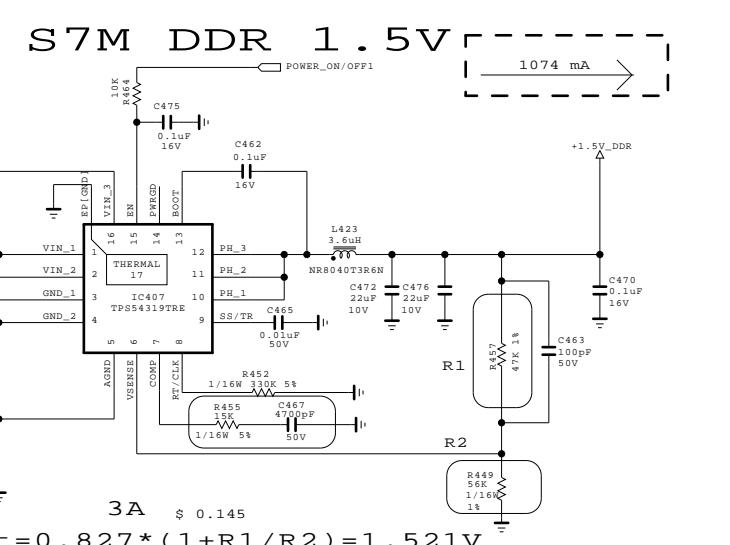
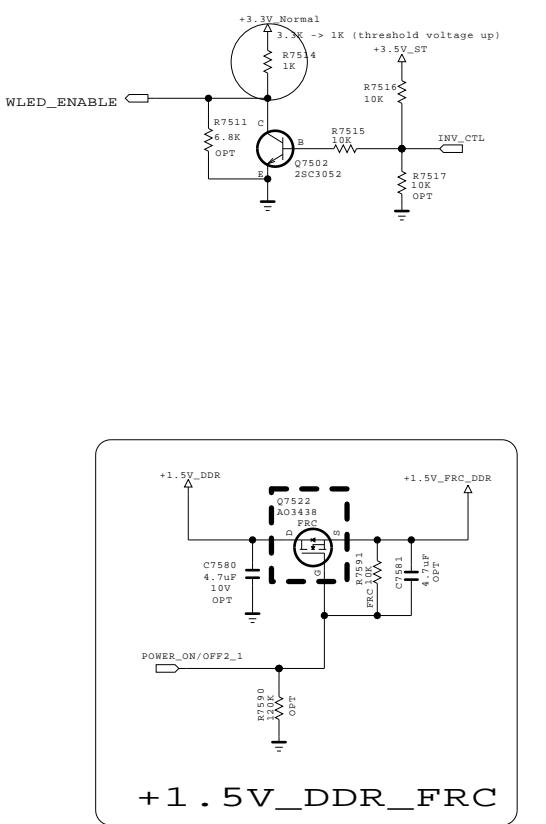
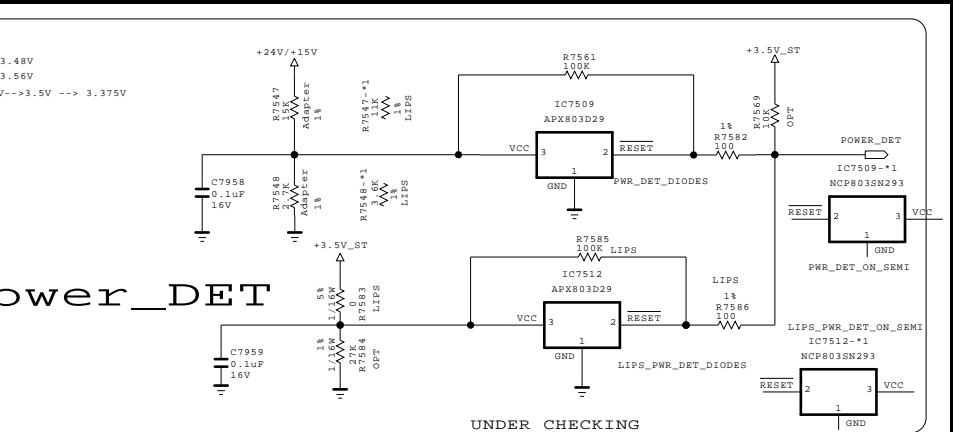
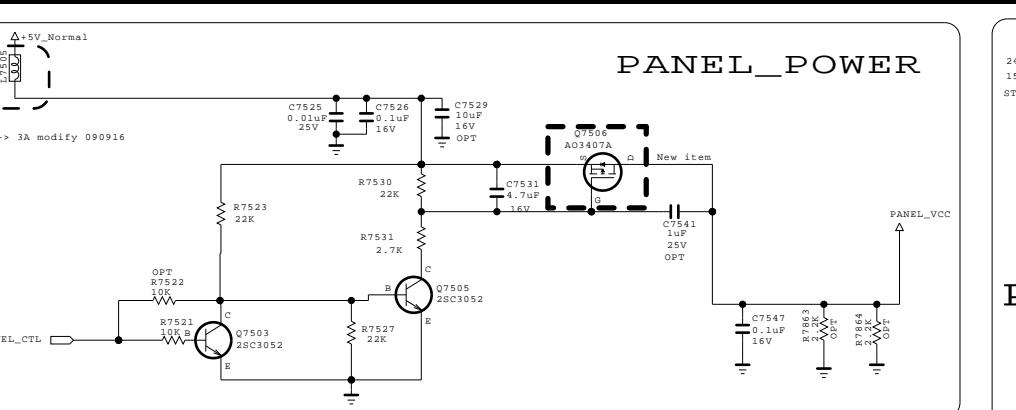
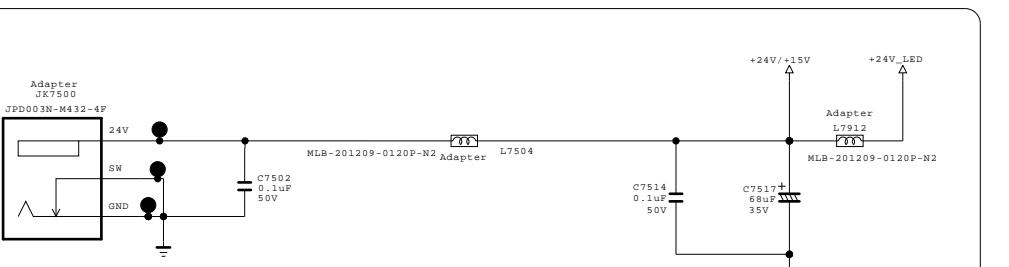


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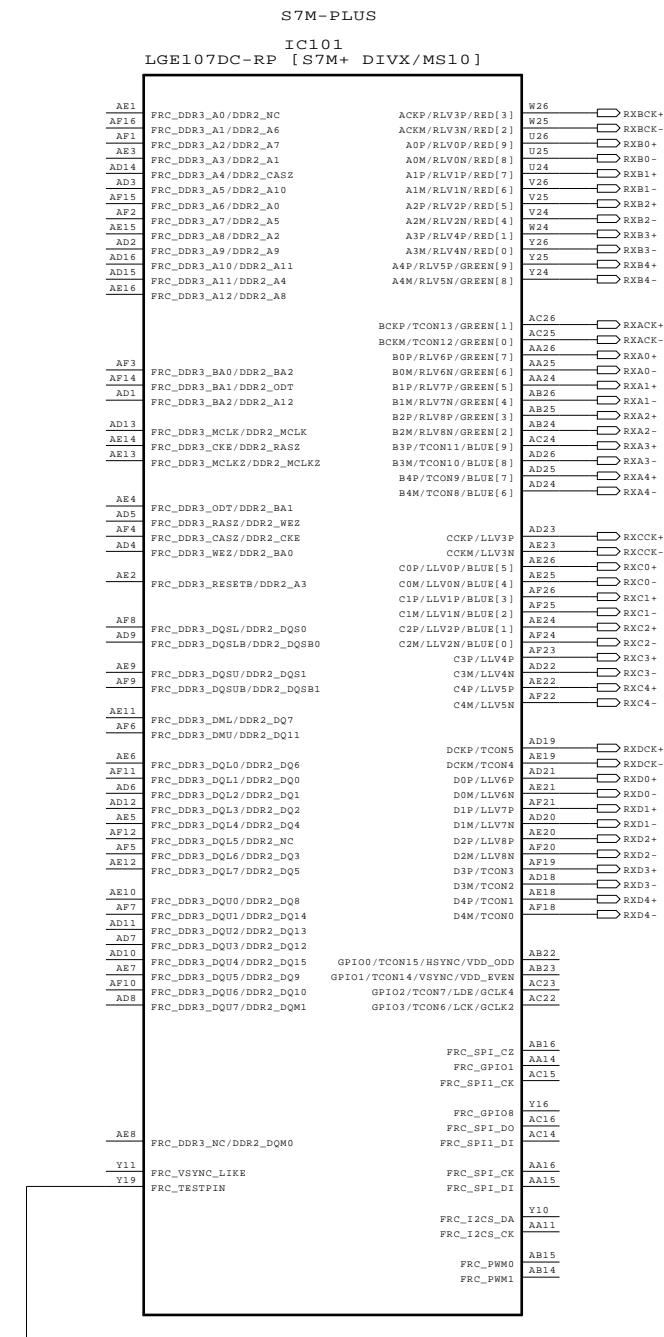
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MODEL	GP2R	DATE	20101023
BLOCK	TN_IR/CONT	SHEET	31 /



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MODEL		DATE	
BLURK		SHEET	/

